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Model, texture and render a fearsome dragon worthy of Game Of Thrones with ZBrush and KeyShot

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Discover the pro arch-vis pipeline and add a touch of class to your 3ds Max interior designs

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Get to grips with ZModeler Page 42

> For pieces like armour plates you need to retopologise them properly to have your edges in exactly the right place

Frederic Daoust on how to achieve your best ever renders **Page 45**

Frederic Daoust
artstation.com/artist/fredericdaoust23

Software ZBrush, KeyShot, Photoshop

Power up ZBrush **Page 32**

Welcome

Far from just being an intuitive and robust digital sculpting tool, ZBrush can now do pretty much anything you want it to if you're a modeller. The work of the ZBrush artists that we invite to contribute to the mag and that of the wider community is often astonishing – and I'm sure plenty of you reading this are exceptional ZBrush artists too – but what does it take to reach the next level? We've assembled a sculpting dream team to answer that question, and their expertise will help you to optimise the ZBrush interface to improve your workflow, get to grips with essential brushes, maximise detail and more.

This collection of crucial tips and insight runs straight into two ZBrush tutorials that are straight out of the top drawer to get you engaged and putting theory into practice – master hard surfaces with ZModeler and create Frederic Daoust's superb cover image, and then get your organics up to scratch by sculpting an incredible dragon.

Elsewhere in the mag we've got the pro 3ds Max to V-Ray pipeline, sci-fi concept vehicles, ragdoll physics in Houdini, advanced animation in Maya, our expert review of Substance Painter 2, page after page of the best 3D imagery around... the list goes on. Go and discover it all for yourself and I'll see you next month.

Steve Holmes, Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

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☎ +44 (0) 1202 586200
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Circulation
Head of Circulation Darren Pearce ☎ 01202 586200

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Finance Director Marco Peroni

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Printing & Distribution
Printed by William Gibbons & Sons Ltd, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

Distributed in the UK, Eire & the Rest of the World by Marketforce, 5 Churchill Place, Canary Wharf, London E14 5HU
☎ 0203 787 9060, www.marketforce.co.uk

Distributed in Australia by Gordon & Gotch Australia Pty Ltd, 26 Rodborough Road, Frenchs Forest NSW 2086, Australia
☎ +61 2 9972 8800, www.gordongotch.com.au

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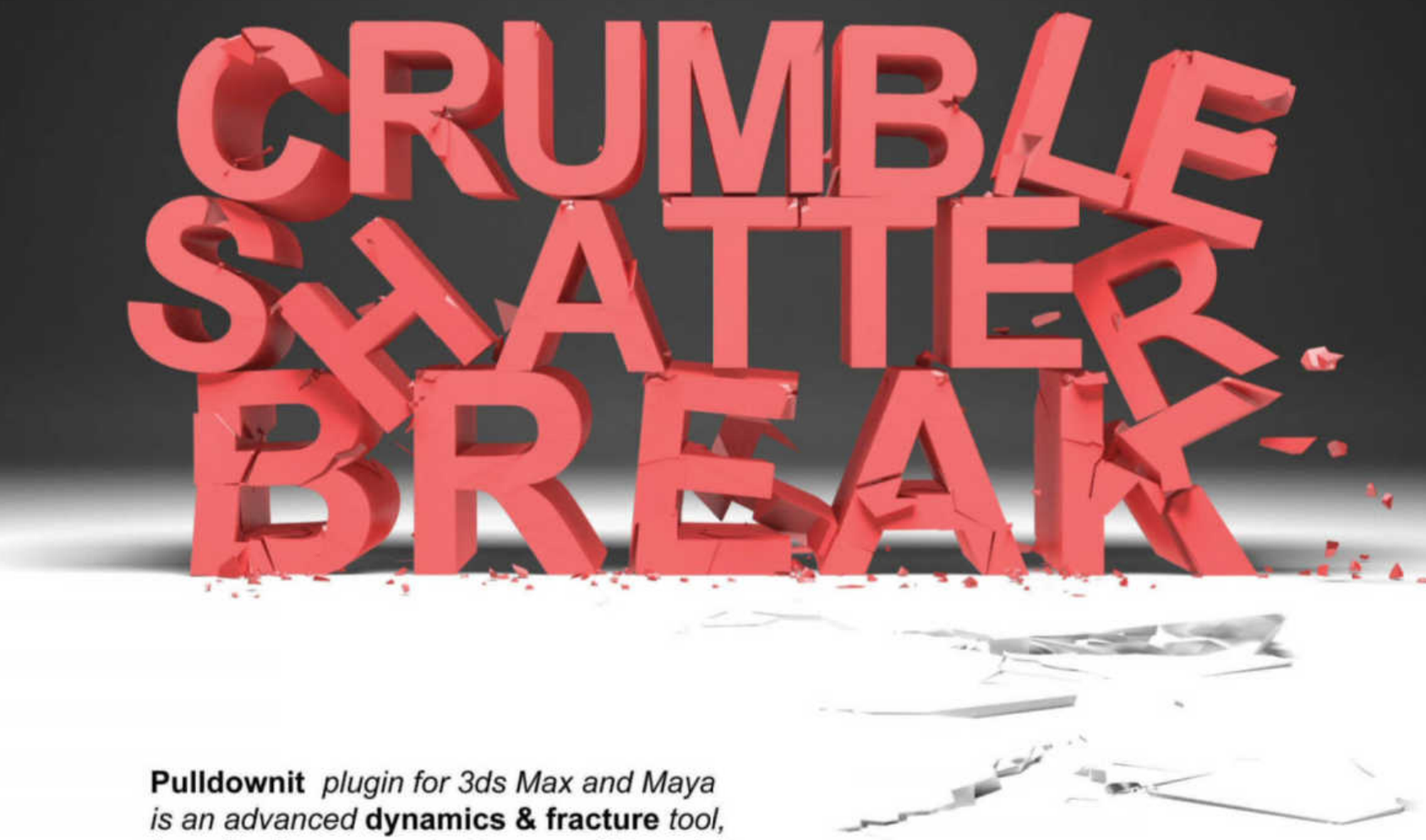

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THINKINETIC

The Expert Panel

This issue's team of pro artists...

FREDERIC DAOUST
artstation.com/artist/fredericdaoust23

Frederic is a newcomer to **3D Artist** and got the cover on his first try! It's a wonderful image, and you can learn to re-create it yourself in ZBrush, KeyShot and Photoshop on p42.
3DArtist username fred2303

JAMES SURET
artstation.com/artist/zerojs

On the eve of season six of *Game Of Thrones*, we wouldn't be doing our job if we didn't commission a stunning dragon tutorial for you to play with. Get to grips with James's masterpiece on p50.
3DArtist username zerojs

PAUL HATTON
jonathan-benainous.blogspot.com

Learning the ins and outs of a solid professional pipeline is essential when you work in the industry. On p58, Paul reveals the 3ds Max to V-Ray pipeline he uses in the studio for stunning arch-vis.
3DArtist username Phatton

MATTHIAS DEVELTERE
develteremattthias.wordpress.com

It's often the case that the very best conceptual vehicle designs are those based on tangible, real-life examples. Matthias teaches you how to elevate your own concepts to a high standard on p66.
3DArtist username DevMatt

RAINER DUDA
rainer-d.de

Among all of the updates that Side Effects rolled out for the launch of Houdini 15, our favourite had to be the new robust ragdoll tools. Rainer shows you how to make the most of these on p68.
3DArtist username Rainerd

JAHIRUL AMIN
jahirulamin.com

After blocking in his animation in part one last issue, Jahirul returns to finalise his parkour manoeuvre on p72. He's kindly donated tons of quality videos and scene files, which you can grab from FileSilo.
3DArtist username n/a

JAMES CLARKE
twitter.com/jasclarkewriter

Overworking can be a good thing for the ambitious, so James contacted the diligent guys at Uniform to learn how they animated a dragon for a proposal to build a New Chinatown. Find out on p90.
3DArtist username n/a

PAUL CHAMPION
linkedin.com/in/pchampion

On p22, Paul spoke to the Redshift dev team, OutpostVFX, Glassworks and Blue Zoo about how Redshift is leading the way in GPU rendering, and how its speed is revolutionising production.
3DArtist username Rocker

IAN FAILES
vfxblog.com

Ian has gone above and beyond this month to round up an exceptional group of ZBrush artists and ask them what makes them tick in the software. His feature starts on p32.
3DArtist username n/a

3D rendering?
There's fast, then there's fast.

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"We opted to switch to Redshift half-way through the series"

Tom Box from Blue Zoo on making the jump to Redshift
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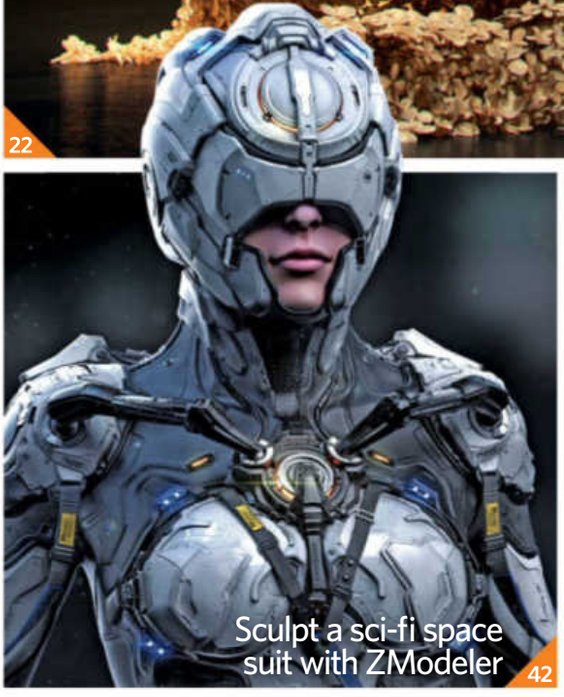

Sculpt a sci-fi space suit with ZModeler

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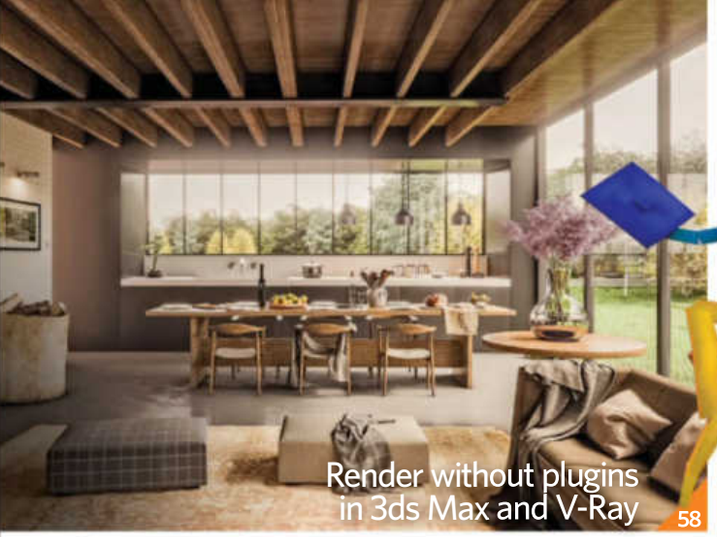

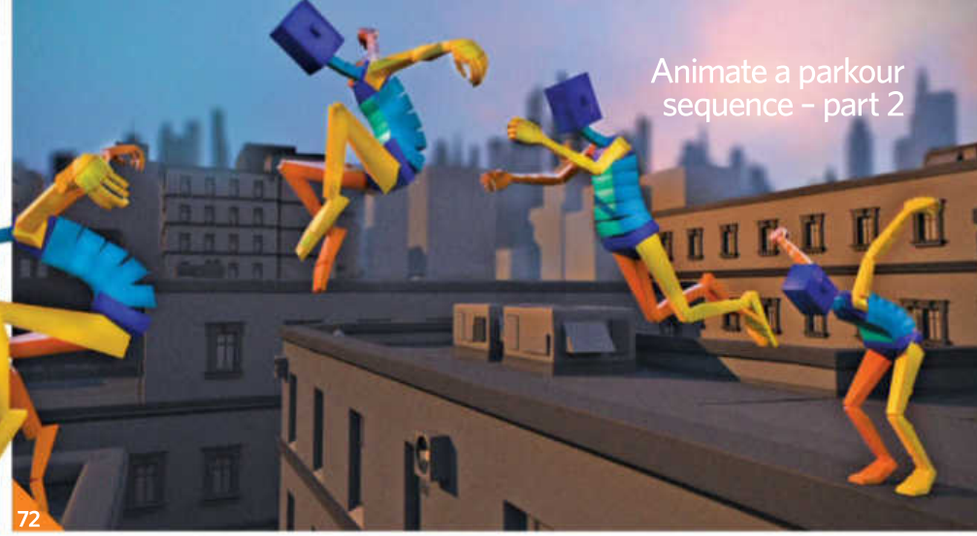

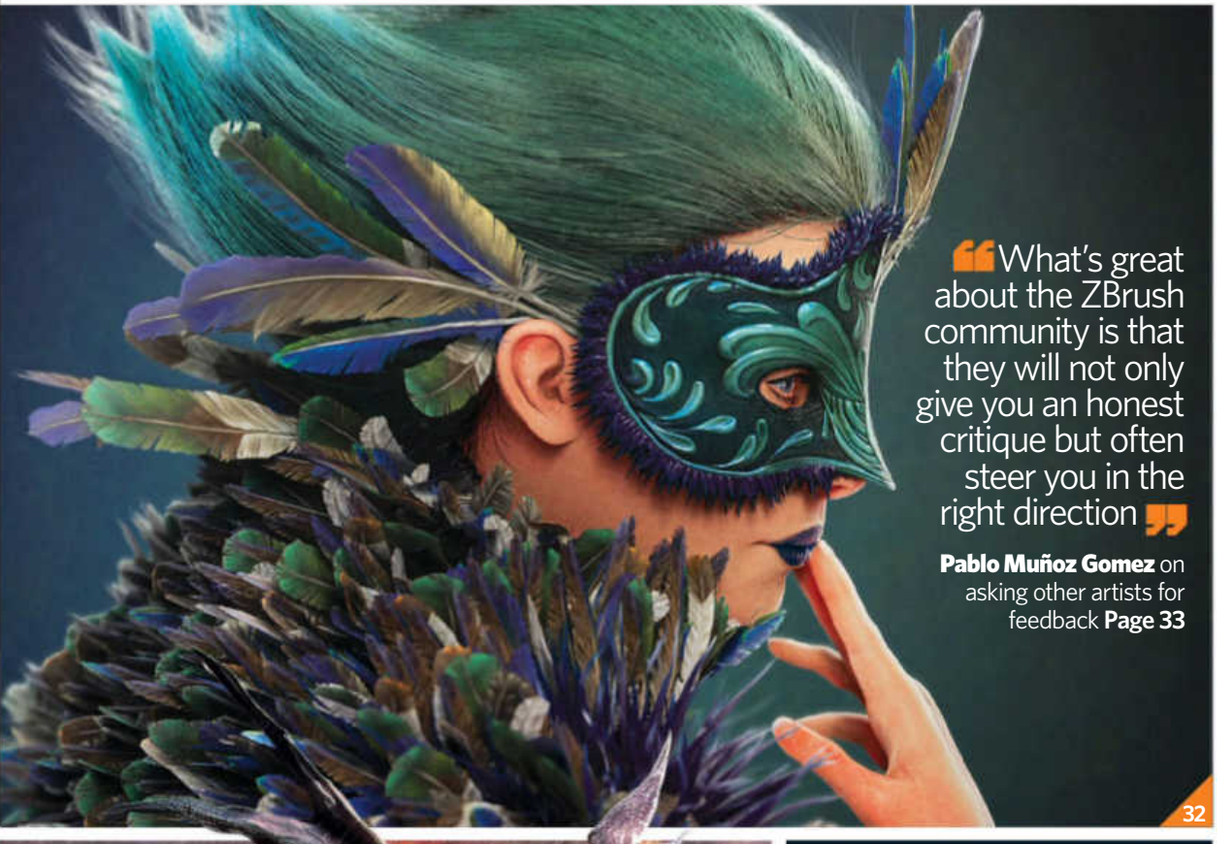
“What's great about the ZBrush community is that they will not only give you an honest critique but often steer you in the right direction”
Pablo Muñoz Gomez on asking other artists for feedback **Page 33**
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The very best images of the month from www.3dartistonline.com

The Gallery

Have an image you feel passionate about? Get your artwork featured in these pages
Create your gallery today at **www.3dartistonline.com**

Julian Santiago
juliansantiago.artstation.com

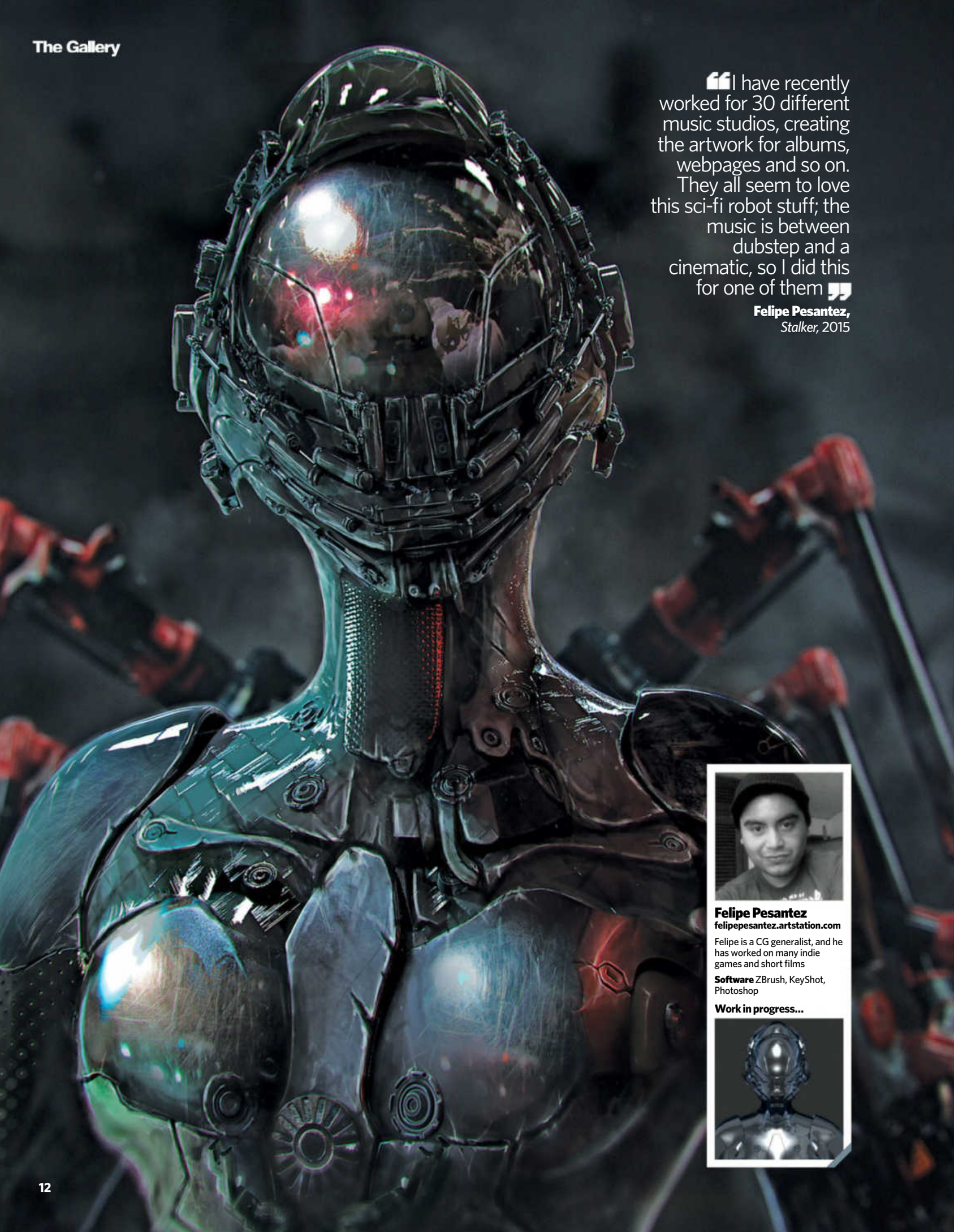
Julian is a 3D generalist with four years of studio experience in advertisements and VFX

Software Blender, V-Ray, Fusion, Photoshop

Work in progress...

"I created this image with the intention of learning and testing V-Ray for Blender in an actual production; a sort of trial by fire. I took my inspiration for this image from the many times I struggled to pull out my earphones while in a crowded public vehicle"

Julian Santiago, *The Perils of Modern Vampire Hunting,* 2016



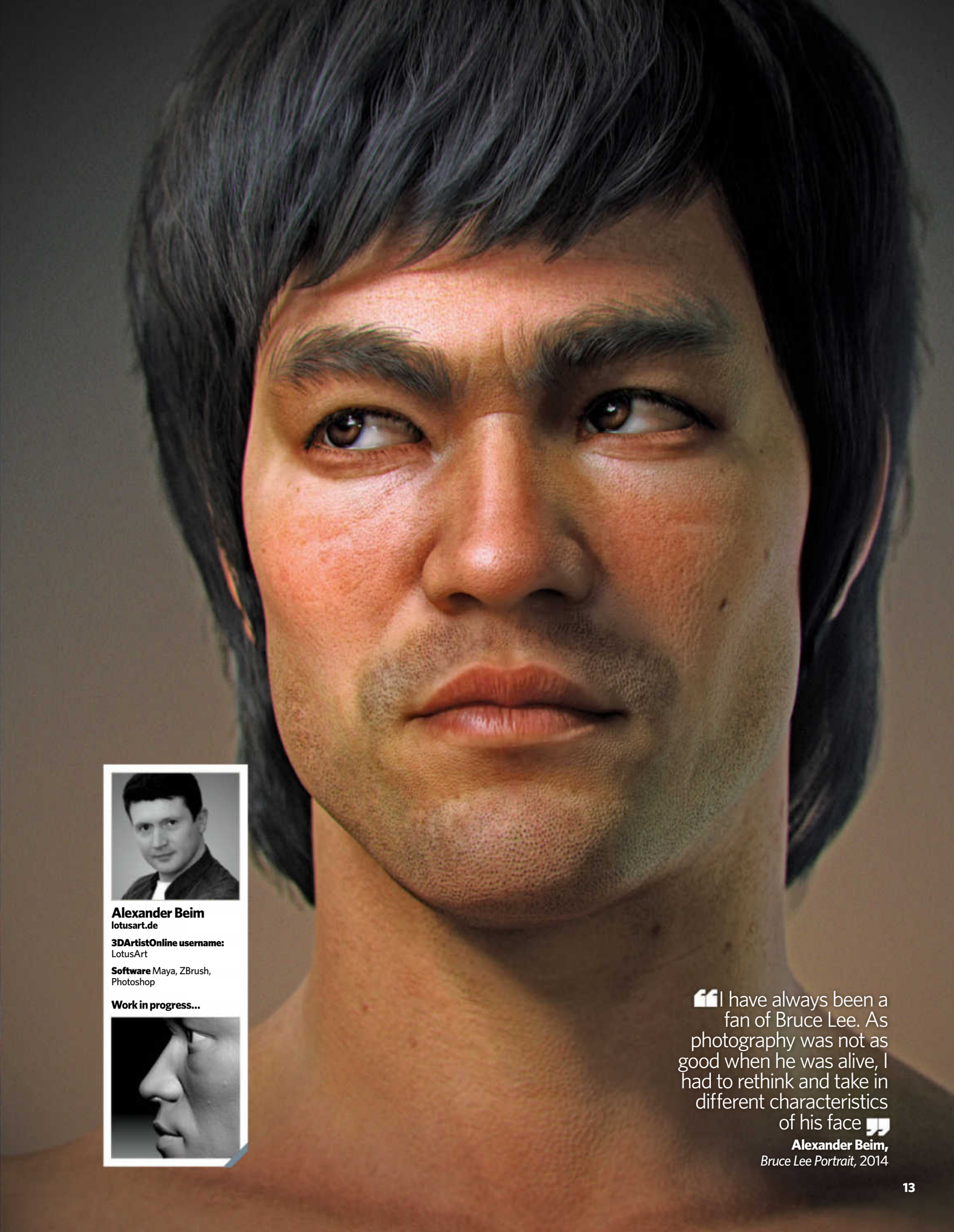
> I have recently worked for 30 different music studios, creating the artwork for albums, webpages and so on. They all seem to love this sci-fi robot stuff; the music is between dubstep and a cinematic, so I did this for one of them
>
> **Felipe Pesantez,** *Stalker,* 2015

Felipe Pesantez
felipepesantez.artstation.com

Felipe is a CG generalist, and he has worked on many indie games and short films

Software ZBrush, KeyShot, Photoshop

Work in progress...



Alexander Beim
lotusart.de

3DArtistOnline username:
LotusArt

Software Maya, ZBrush, Photoshop

Work in progress...

"I have always been a fan of Bruce Lee. As photography was not as good when he was alive, I had to rethink and take in different characteristics of his face"

Alexander Beim,
Bruce Lee Portrait, 2014

"I was recently engaging my thoughts on the book *7 Habits Of Highly Effective People* by Stephen Covey and the concepts presented are profoundly life-changing. I have had a few paradigms shifting myself, and what better way to express this than to create artwork? And so, this piece was born"

Reynante Martinez,
Paradigm, 2016

Reynante Martinez
reynantemartinez.com

A self-taught artist and Blender user for 12 years, Reynante specialises in lighting

Software Blender, Cycles

Work in progress...

Romuald Chaigneau
romualdchaigneau.free.fr

A 3D artist living in France, Romuald specialises in arch-vis but is totally open to all subjects

Software 3ds Max, V-Ray, Photoshop

Work in progress...

“Lost in the Forest is a project created in 2015. It is composed of two images with night lighting and two images with day lighting. Using a photo on Instagram for inspiration, the aim was to re-create a scene with a natural light and a magical, mysterious atmosphere”

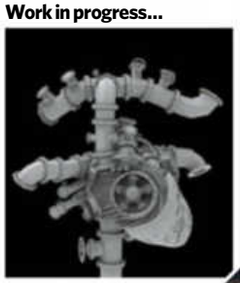
Romuald Chaigneau,
Lost in the Forest, 2015

Juraj Bezák
5dimensions.sk

3DArtistOnline username:
five dimensions

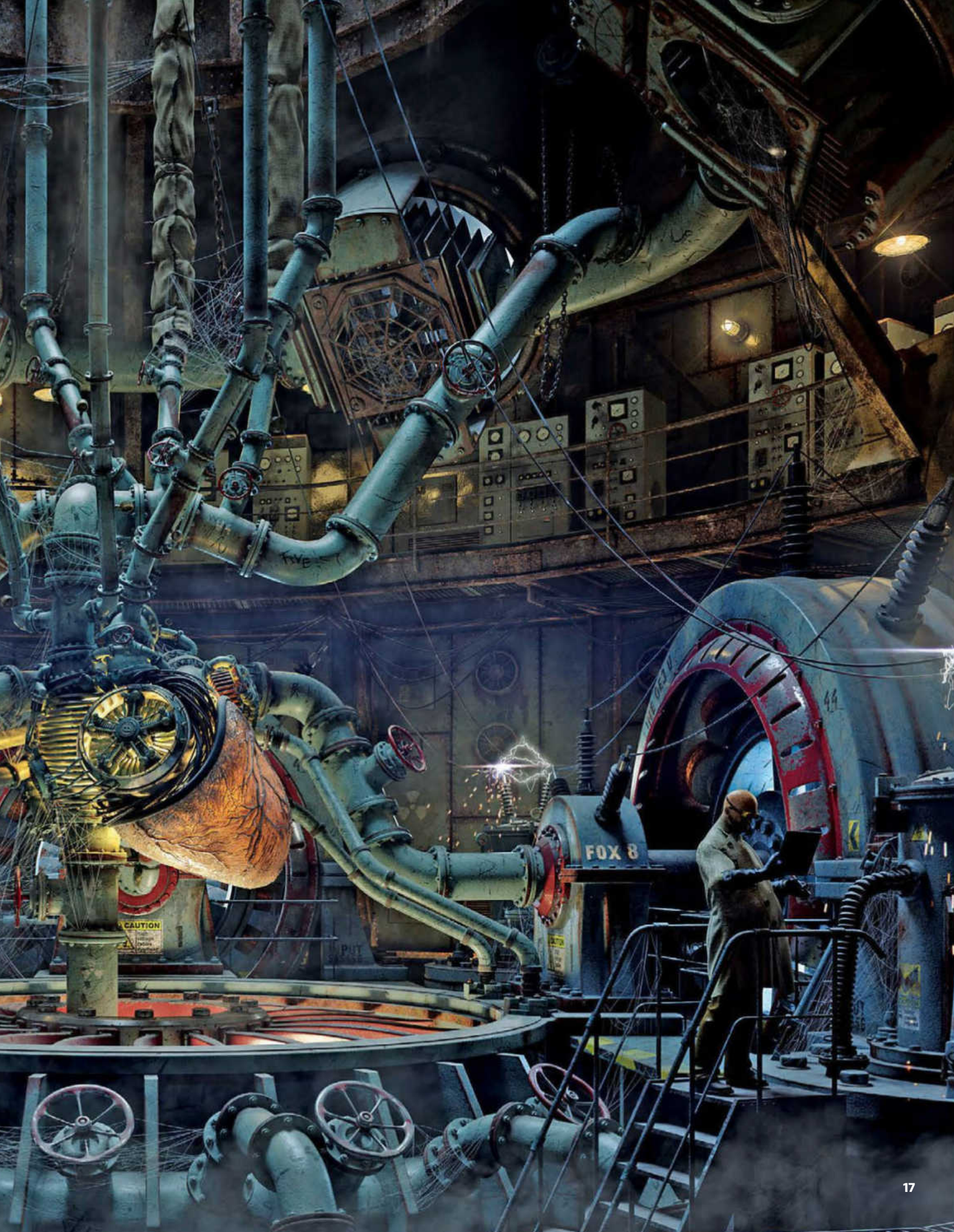
Software 3ds Max, V-Ray, ZBrush, After Effects

Work in progress...



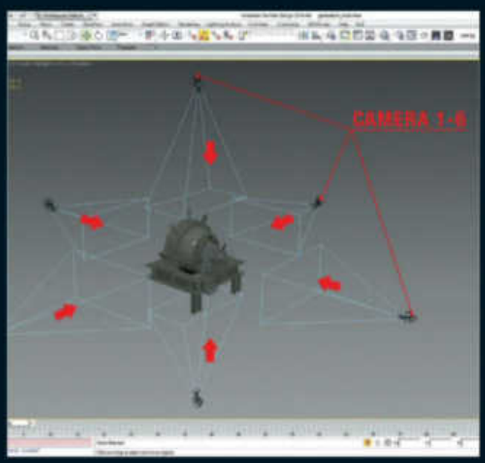
"The idea was to create a fantasy engine room with a special power generator. For the shape of the generator I chose a human heart because the heart is a generator that keeps us alive, just as well as any other power generator. The picture also represents that the artist's heart beats for CG"

Juraj Bezák, *Heart Engine Room,* 2016

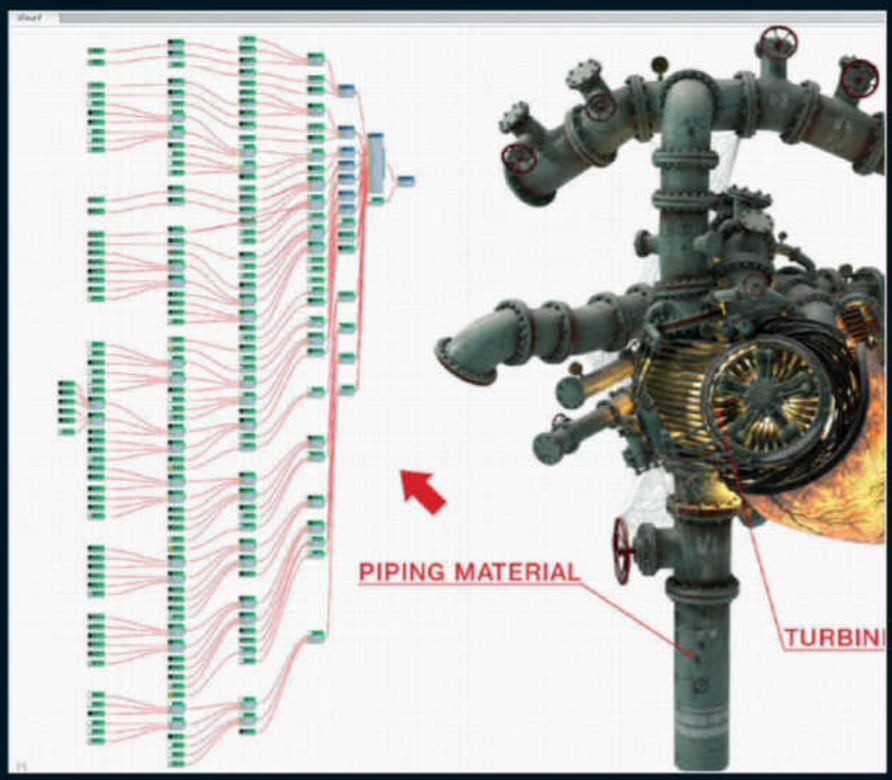

FOX 8
CAUTION

> Up to 90 per cent of the models in the scene were created in ZBrush. Rendering and texturing were done in 3ds Max and some post-production was done in After Effects. This is only a small part of a bigger project that I am working on at the moment, and I am currently preparing a 3D animation of an engine room
>
> **Juraj Bezák,** *Heart Engine Room,* 2016

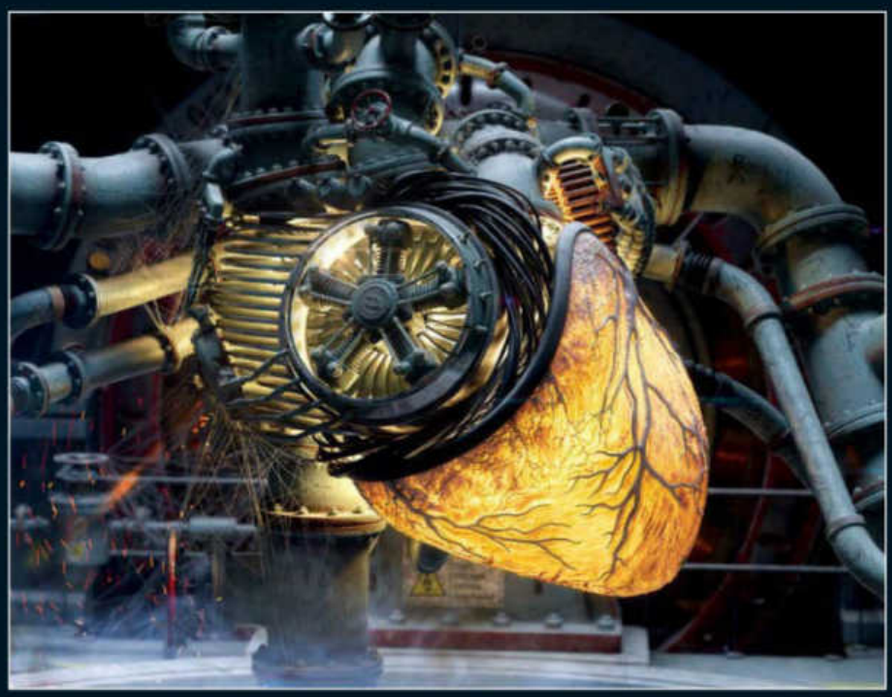
MODELLING
ABOVE The ZModeler brush, which is a new feature in ZBrush 4R7, made my job easier. I was using a procedure in which I was able to quickly and easily create highly detailed and sophisticated models by using a combination of actions that include the QMesh, Insert and Bridge tools. The pipe is the most significant, and it has a lot of details that were created using the Insert Mesh tool. This tool helped me to add a lot of little details to the model that would normally take an enormous amount of time to create.



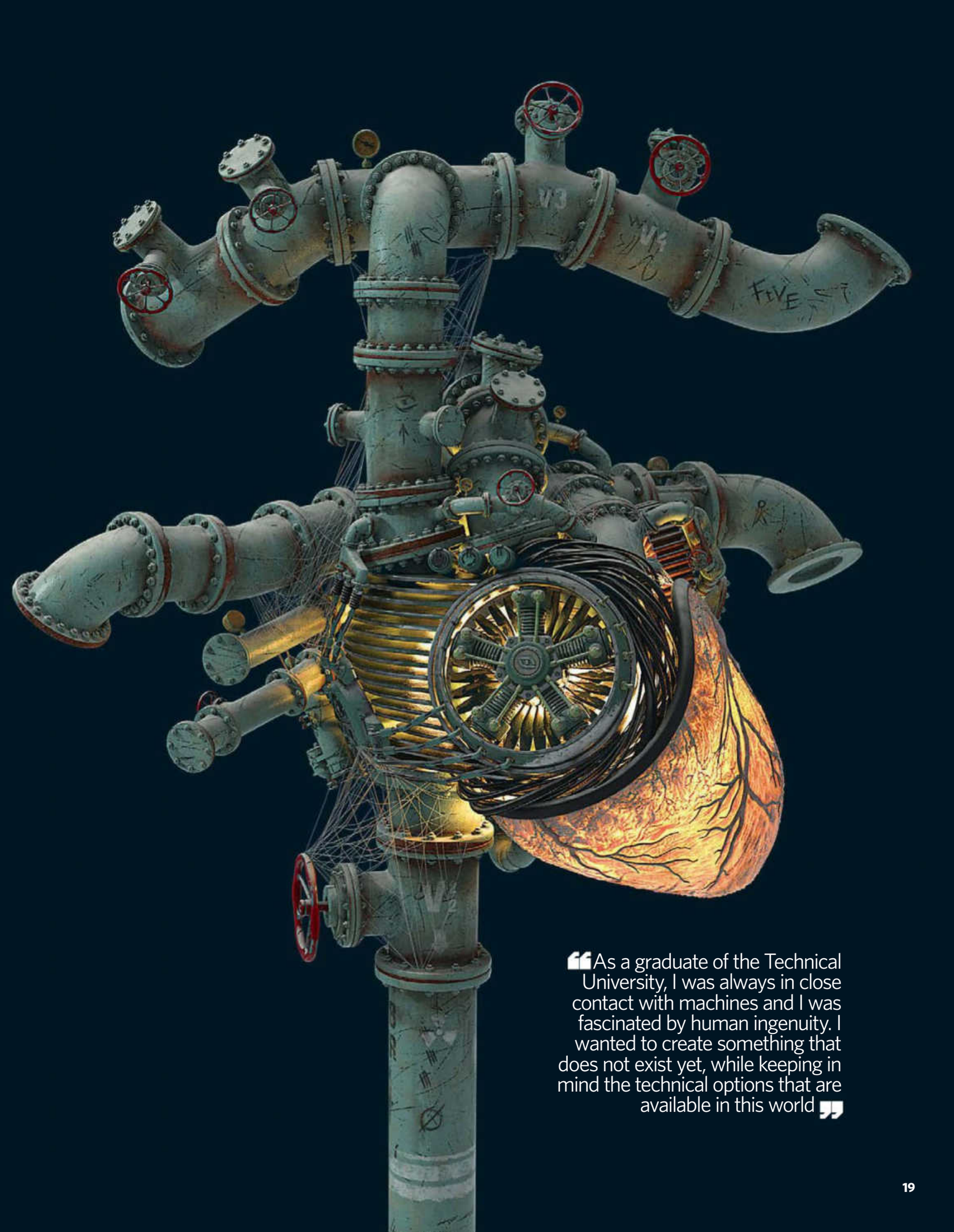
TEXTURING
ABOVE I wanted to create the effect of an old, little-used machine room full of various devices with a mechanical heart as a power generator in the centre. Before I had even begun I knew there would be a lot of modelling and texturing work involved. I decided to use a workflow by Neil Blevins ('Shading A Hard Surface Model') as well as his Soulburnscripts to accelerate and facilitate the work. I used a method of blended box mapping (triplanar texturing) for texturing the models. This method enabled me to quickly and effectively texture multiple objects at the same time, which is a great time-saver.



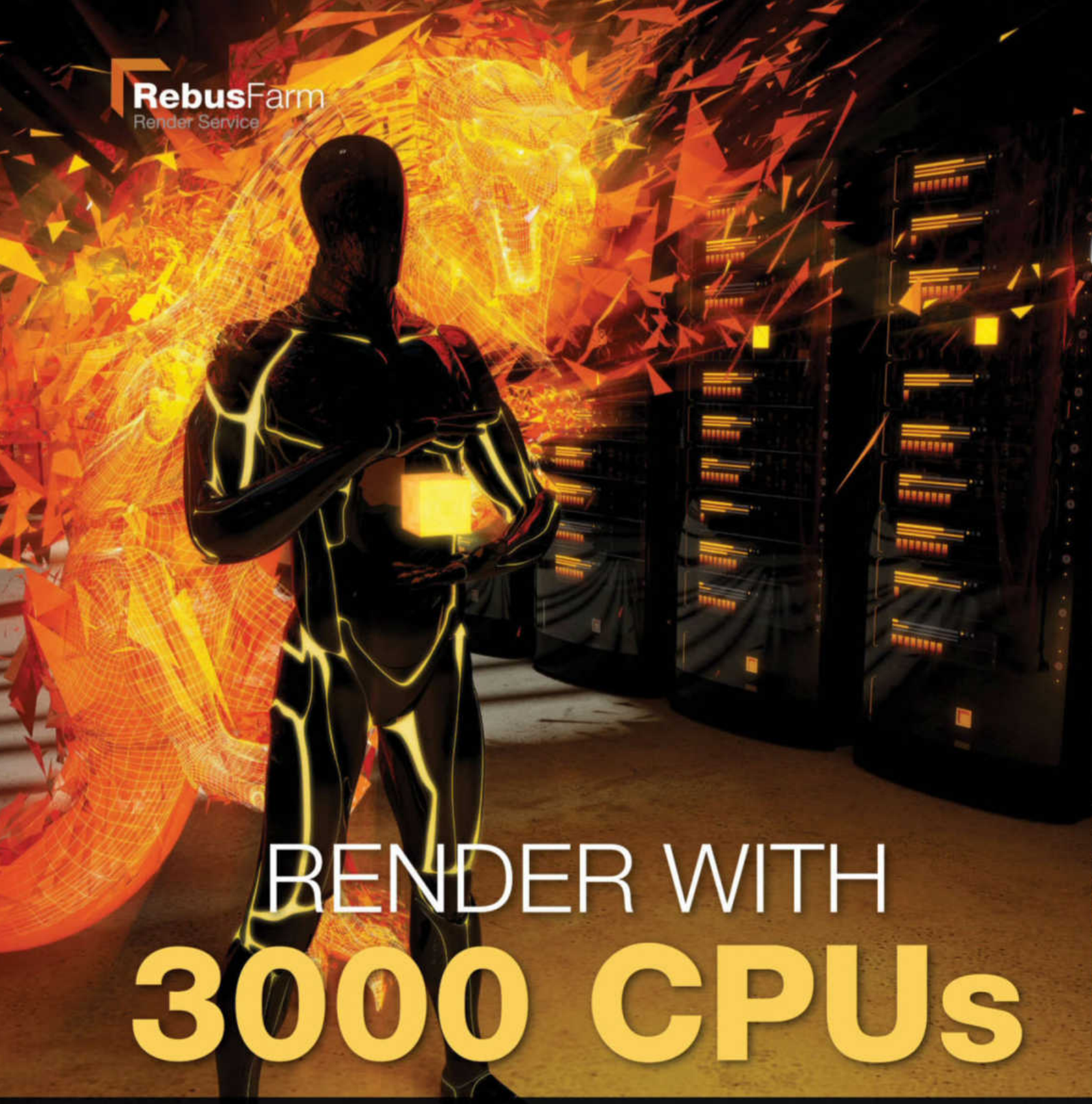
MATERIALS
ABOVE I mastered materials made by Neil Blevins, which were modified to suit my needs. Almost all materials in the scene were VRayBlendMtls. The advantage of using this material type is that it enables us to simulate particular layers of materials from the metal on the bottom to the dust deposited on the surface. In combination with the blended box mapping method we were able to create the effect of dirt, rust, scratches and decals on the surface by projecting textures over one another.



RENDERING AND POST-PRODUCTION
ABOVE The image was rendered using V-Ray with a few element passes that have been used in post-production. The rendering of the entire scene at a resolution of 5K took over 30 hours on an i7 (6-cores). Particle effects such as smoke, steam, flashes, dust, atmosphere, sparks and glow were added in After Effects. Element passes and additional effects enhanced the final image and highlighted details.



“As a graduate of the Technical University, I was always in close contact with machines and I was fascinated by human ingenuity. I wanted to create something that does not exist yet, while keeping in mind the technical options that are available in this world”



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3D ARTIST

My name is Cauê Rodrigues and I'm a 34 years old CGI Artist from Brazil specialized in architectural visualisation. This project is called "Duo Project" and was born after me and my wife–we are also business partners– saw a very nice image on the internet which inspired us. It had good lighting and nice mood, so we decided to reproduce it but with some alterations and adding our own details. We imagined what the scene would look like, experimenting with camera positions, changing furniture and materials like the floor, woods and so on. The scene was created using Corona Renderer which we really like a lot as it keeps our workflow simple and helps us to focus. In the end we selected 7 camera angles and rendered the final images at Rebusfarm.net. Their render time is very good and the pricing is favourable. Thank you so much guys!

Portfolio: **http://cauerodrigues.net/**

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Age of Vultures by Toni Bratincevic

Faster Than Light

As Redshift matures, we find out what makes the award-winning software the go-to GPU renderer for more and more studios

Redshift is a production-quality GPU-accelerated final frame renderer capable of rendering images several times faster than CPU-based solutions, while offering the features and flexibility of a state-of-the-art CPU renderer. Its story officially began in 2013 when Redshift Rendering Technologies was founded by videogame veterans Panagiotis 'Panos' Zompolas, Nicolas Burtnyk and Rob Slater.

Since then, a user base of thousands has built up worldwide, including notable studios such as Glassworks, Blue Zoo, OutpostVFX, Original Force, Jim Henson's Creature Shop, Guru, Shed and MediaMonks. Feathers in the cap include Hollywood productions such as *Fury, The Expendables* and *Aloha*, multiple all-CG Netflix and Amazon original series as well as hundreds of TV, print and web ads. We caught up with Redshift's CTO and co-founder Panos Zompolas, co-founder of Blue Zoo Tom Box, OutpostVFX managing director Danny Duke and Head of 3D at Glassworks London Alastair Hearsum to find out how Redshift is revolutionising the industry.

When Redshift was released, there were already a handful of GPU renderers on the market. "Due to their technical limitations, most of these renderers were dismissed as 'toy' renderers or renderers that were only good for previsualisation," begins Zompolas. "So right from the beginning we knew what we didn't want Redshift to be. We worked hard on not only making Redshift amazingly fast, stable and efficient, but also production-ready, flexible and feature-rich. Redshift supports a wide variety of

features not found on most GPU renderers out there. Examples include our out-of-core architecture, comprehensive object visibility and matte options, light-mesh linking, a comprehensive set of AOVs, deep and layered EXR support, ray switches, proxies, complex shader graphs, UDIM/UVTILE support, fast and clean volumetric rendering, multiple available GI techniques, a comprehensive set of light types, an SDK for integration with scene assembly pipelines, command-line rendering and others. All that while still being the fastest renderer among not only CPU renderers but GPU ones as well."

What sets Redshift apart from other solutions can be put simply: Redshift is the world's fastest production-ready renderer, resulting in significant cost savings and improved quality. "Our customers report performance gains ranging from five times to 20 times or even higher (depending on the hardware) compared to CPU renderers," Zompolas continues. "A phrase we hear time and time again from our customers is 'this project wouldn't have been possible without Redshift'.

"Redshift's visual quality and cost-saving advantages make it the obvious choice when it comes to rendering episodic content such as TV/Netflix/Amazon originals as well as tight-deadline projects such as TV/web commercials. There are several high-profile projects currently in production using Redshift, ranging from animated children's series to triple-A videogame cinematics, to full-length animated features. Redshift is more cost-effective not only against CPU rendering, but also against cloud rendering solutions.

"Rapid iteration during the look-dev stage helps artists improve visual quality and maximises their creative potential. Improved performance also means being able to enable 'expensive' rendering features such as motion blur, depth of field, GI, glossy reflections and complicated light rigs without killing rendering times. Redshift reduces costs by allowing studios to complete projects with significantly smaller render farms. Fewer machines means lower hardware, software (fewer licences needed), administration, power and space costs."

But it's not always plain sailing when developing a GPU renderer as challenges have had to be met and overcome, as Zompolas explains. "GPUs have a lot more raw computing power than CPUs. But if you simply port an algorithm designed to run on CPUs to the GPU, you're not going to effectively harness this computing power.

"Almost all of the graphics algorithms used in Redshift had to be re-designed to run efficiently on GPUs. These include algorithms for ray tracing, importance sampling, texturing, shading, point clouds, AOVs and others.

"Another major challenge was handling the large datasets typically involved in production scenes. Redshift is capable of rendering scenes using tens of gigabytes of uncompressed texture data and hundreds of millions of unique (non-

RAYS VRAM

At Glassworks we have found that increasing the VRAM set aside for rays can significantly improve render speed in a lot of cases.

Alastair Hearsum, head of 3D, Glassworks London

A Large Evil Corporation used Redshift to create its homage to the Cornetto trilogy

The Boat by Dmitri Maslakov was created to test Redshift's rendering capabilities

Milosz Wlazlo made this scene in Redshift, along with After Effects for a tiny bit of post-production

instanced) polygons. To achieve this, we developed an efficient 'out-of-core' architecture that allows the rendering of scenes that exceed the GPU's available memory. This is a particularly important achievement considering that most GPUs have limited memory compared to CPUs."

That's not all, Redshift will receive a new shader and a broader range of plugins in 2016 too. "We're working on a new PBR-based shader which will add support for multiple BRDFs (Beckmann and GGX), single-scattering, nested dielectrics, dispersion and others. The shader will closely follow standards like Disney's physical shader, which is currently seeing wide industry adoption.

"We're also working on volumetric rendering support via OpenVDB and support for custom (user-defined) AOVs. 2016 will also see the release of our 3ds Max plugin (which is currently in alpha) and will introduce Redshift plugins for Houdini and Cinema4D. In terms of features, we'll be looking at distributed/remote rendering, a shader SDK to allow users to write their own shaders with support for OpenSL and a custom Redshift framebuffer."

"To those that haven't tried Redshift, we want to say that we know that evaluating a new renderer takes time and effort. However, if you're between projects, you owe it to yourself to at least try Redshift. The next time you bid on an animation project, there's a good chance you'll be bidding against a competing studio that is already using Redshift," asserts Zompolas.

Glassworks London adopted Redshift into its pipeline around two to three years ago. "An erstwhile employee of the company and regular freelancer had seen it in action elsewhere and said it was so incredibly fast that

OPTIMISE TEXTURES

We've found it's not the polycount that slows down rendering, it's texture sizes, so work with the smallest texture resolutions you can get away with.

Tom Box, co-founder of Blue Zoo Animation

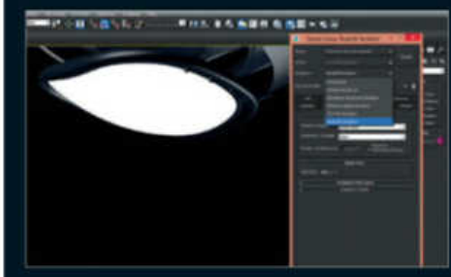
RENDER MULTIPLE FRAMES AT ONCE

Redshift's command line allows systems with multiple GPUs to render multiple frames at once and get a better CPU-to-GPU performance ratio.

Nicolas Burtnyk, CEO and co-founder of Redshift Rendering Technologies

SCI-FI EFFECTS WITH REDSHIFT IN 3DS MAX

Rainer Duda reveals how to render a robotic TV with a glossy reflection, and give it a different reflection colour via Redshift's Ray Switch



01 Redshift as a renderer First, ensure that Redshift is the main renderer by going to the Render Setup window and switching the renderer to the Redshift render engine. Afterwards jump into the GI tab. Now set the Primary GI Engine to Brute Force, and then inside of Brute Force increase the Num Rays to a value of 512 or higher.

02 Place the light Now let's put a Redshift Physical Light into the scene. Change the Light Type to Area and scale it up. Choose a black-and-white HDR map for the Color Map. Lower the Intensity value to 75 and raise Samples to 512 or even higher for a clean-looking image. Underneath, in the Area rollout, uncheck the Bi-directional box.

03 Glossy reflection material We need an almost black mirror for our scene. Utilise a large grid on the ground and apply a Redshift Architectural Material. Choose black as the Diffuse Color and white as the Primary Reflection Color. Raise Samples for Primary Reflection and lower Glossiness to 0.9 to add some blurry reflection.

04 Utilise reflection rays To influence the reflection of light-emitting geometry like the screen create a Redshift Incandescent material, and use a Redshift Ray Switch Node as Color input. Use Camera Color as your main texture and Reflection Color as reflection information. Apply the Incandescent material to your object.

05 Create atmosphere Time to create atmospheric magic. Press 8 on your keyboard and add Redshift Volume Scattering as an Atmosphere Effect. Now increase the Attenuation to a value of 0.005. For volumetric lighting select the Light and increase the Volume Contribution to 0.007 in the Modifier Panel. Increase Samples for a clean-looking image.

06 Add a vignette effect To add a cool vignette effect simply jump into the 3ds Max Environment and Effects window with the 8 key, and in the Environment tab choose the Redshift Photographic Exposure under Exposure Control and click Activate. Under Redshift Photographic Exposure Parameters>Film Settings increase Vignetting to 20.

> Redshift's IPR is a huge plus for lighting variations and it enables you to tweak with accurate feedback to get the final desired result
>
> **Jean-Michel Bihorel**

we had to try it out," explains Alastair Hearsum. "We did and were converted straight away. We had invested a fair bit on Arnold over the previous few years but it was clear that this was a game changer for us in the same way Arnold had been previously. It's our default renderer. We turn to Arnold only when Redshift can't do something, which is rarely."

"Projects with all CG-enclosed interiors are the ones that slower renderers struggle with getting an acceptably smooth result. You end up compromising with image resolution, resorting to post-production, depth of field and so on. With Redshift you can turn all that stuff on, turn up the sampling and not miss the deadline. For example, one [piece of work] that we are most proud of and looks pretty is the Camelot ad we did just over a year ago. The opening interior shot has a lot of bounced light and a Christmas tree with hundreds of thousands of fine needles, and yet Redshift just munched through it."

DOUBLE-SIDED SHADING

Using the powerful Redshift Ray Switch shader, you can easily texture and light paper-thin objects without having to model them with actual thickness.

Rob Slater, VP of engineering and co-founder of Redshift Rendering Technologies

Back in 2015, Blue Zoo was creating an animated TV series and the render farm backlog was getting bigger and bigger, so the team looked for an alternative way to render. "We tested out Redshift and were blown away by the speed, without sacrificing render quality," says Tom Box. "So we opted to switch to use Redshift half way through the series, which is only done in exceptional circumstances, but the speed increase was exceptional!" The majority of Blue Zoo's work is now Redshift rendered, "We currently have four different children's TV series in production alongside TV commercials, and they all use Redshift for their rendering."

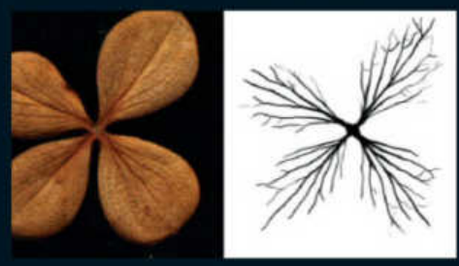
The inclusion of Redshift into Blue Zoo's pipeline has meant that some changes were required. "The integration was pretty straightforward as it plugs into Maya the same way other renderers do. We needed to upgrade our graphics cards to newer ones with more GPU cores. We had a lot of assets we needed to convert to use Redshift optimised shaders, so we wrote scripts to automatically convert hundreds of shaders, avoiding very laborious work!

"In an increasingly competitive world you need to take every advantage available; CPU render farms can be expensive to run, in terms of electricity, hardware and physical space. Reducing all of those [elements will] help to keep costs down. We currently have over 70 graphics cards on our farm, which means if a frame takes 30 seconds to render, we can render over 100,000 frames overnight!"

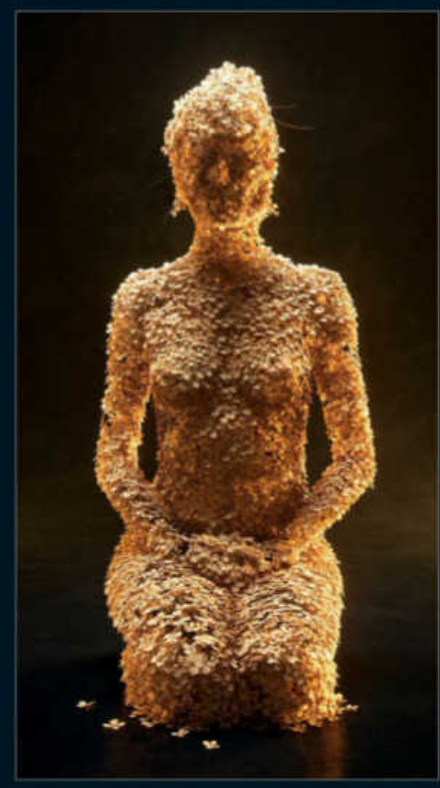
"Some other GPU renders require that the whole 3D scene you want to render is loaded into the memory on your graphics card, for modern complex scenes this is quite an impractical limit!

TRANSFORM YOUR TWEAKS WITH REDSHIFT'S IPR

Home user Jean-Michel Bihorel explains how Redshift helped him to lower the time spent on adding effects in his Flower Figures



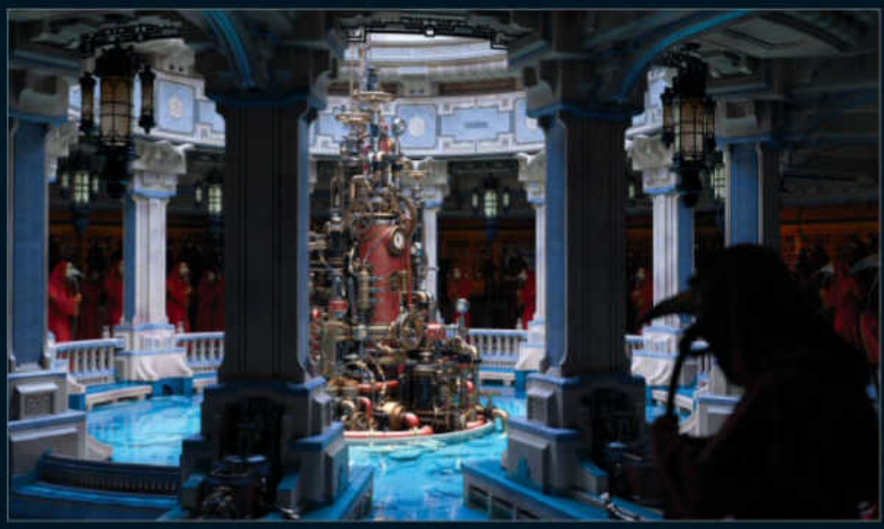
02 Translucency attribute I began creating the best shader for my flower elements. The translucency attribute of the default Redshift shader worked perfectly to give this two-sided lighting effect on the petals, letting roots show in-between as shadows on the back side of the petals. I mapped the translucency attribute to make detailed variations.



01 The IPR Redshift's IPR is a huge plus for lighting variations, and it enables you to tweak with accurate feedback to get the final desired result. It refreshes much faster than V-Ray would in the same situation. When I re-opened my scene, I was able to create this alternate render of Flower Figures.

03 Quick volume fog Usually this effect is a very expensive feature in other rendering software, volume fog here barely slows render time and adds a natural feel. Moreover, the fog is very controllable as you have a multiplier per light to say how much it should affect the fog.

04 Depth of field With IPR you can tweak DOF precisely. The final render took some time to compute because I turned on DOF Volume Fog and GI but with fast feedback, you do save a lot of time on the look development and reach a nicer image faster than with another rendering solution.



BLAZING-FAST WORKFLOWS

Toni Bratincevic tells us how he used Redshift on two NVIDIA GeForce 780 Ti graphics cards to render Age of Vultures in 4K

01 **The layout blocking phase** For the Age of Vultures renders I used Irradiance Point Cache as a primary GI bounce and Irradiance Point Cloud as a secondary, which gave me really fast render times (ten minutes in 2K). Because of the quick rendering speed, I was able to get more iterations and this helped me to make faster progress.

03 **Design the machine** A steampunk theme was used for the central machine. Reusing elements I had from a different project, I was able to block something quickly. RailClone was used to make pipes going around the machine. I then created a few different metal shaders in Redshift and started assigning them to different machine elements.

02 **Make the characters** Inspired by the design of 17th century plague doctor costumes, I made characters in a similar style. The character's body was sculpted in ZBrush and the mask was made with 3ds Max. Redshift's Architectural shader was used for the robe with some translucency, and for skin I used Redshift's Skin shader.

04 **DOF in camera** For most of the objects I just used tileable textures with Redshift's Architectural material. The final image was rendered with real DOF using Redshift Bokeh. Redshift was fast enough to do this at the rendering phase without the need to do it in post-processing. During rendering, Redshift was using around 3GB of memory on the GPU.

Redshift avoids this by swapping the scene in and out of memory, so you can render bigger scenes than your graphics card could normally handle. For our Christmas animated short 'More Stuff' we used Redshift. This made the project possible as we wanted a very high-quality CG finish, but had to render the whole two-minute animation over a weekend. This would have been impossible with CPU rendering. Having Redshift in our toolset gave us the confidence to take the project on with just eight weeks to complete it."

OutpostVFX was established in 2013 and made the decision to use Redshift almost straight away. "At the time, as a small start-up, we could afford to be adaptable and look at emerging technology without huge procurement processes. As we've expanded we've refined our existing rigs with high-end gaming cards rather than Quadros and [created] a purpose-built pipeline and render farm to utilise Redshift at maximum power," explains Danny Duke, managing director of OutpostVFX. "In most businesses, the speed of turnaround is hugely important, but when you couple that with visual perfection we had to look at a renderer that meant we could iterate really quickly, get sign-off from a client and then hit the final render. All of which means we can be more creative in our approach, which in turn means repeat business. Aside from our FX team (where we're still using Arnold for particle simulations) Redshift is our go-to renderer on all CGI so it's 100 per cent of all our 3D environment and character work."

Currently, OutpostVFX is finishing a feature film called *47 Meters Down* for the Weinstein Co. "When we bid on the project we expected around 100 shots and then it quickly turned into over 400, including fully CGI characters (humans, sharks and other sea life), caustics, set extension and so on. Without Redshift there's no way we could have delivered so many shots in the same sort of timeframe. The speed at which you can seek approval before finalising the look, as well as producing final renders, is the key for us. Going from five seconds a frame at previs quality to around five or six minutes a frame for final production-quality beautiful artwork is the reason why GPU rendering is king."

SAMPLING

I would say it's definitely worthwhile spending some time optimising the sampling settings correctly (the reflections, GI, light samples and so on). You can usually end up with significant performance increases.

Alastair Hearsum, head of 3D, Glassworks London

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Technique focus

Incredible 3D artists take us behind their artwork

POST-PRODUCTION My biggest challenge for this was to achieve the cold atmosphere of this specific place in Iceland. I increased the main light a couple of times, using light blue layers set to screen and desaturated them when the light got too much colour. The vignette was done with colour brushes – not with a gradient – for better control.

Laurentiu Stanciu
leadsonarchitects.com
Laurentiu is an arch-vis artist. He specialises in creating digital images and loves his job

Software 3ds Max, V-Ray, Photoshop

Voronoi Harpa Iceland, 2016

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POWER UP ZBRUSH

Take your sculpting skillset to the next level today with our talented team of experts

When artists first got their hands on Pixologic's ZBrush over a decade ago, the software was a revolution in digital sculpting and modelling. As new iterations of ZBrush continue to produce stunning advanced features, so too have its users found innovative ways to make the most of the tool.

Belgian freelance sculptor Maarten Verhoeven is an advanced ZBrush user with a leaning towards detailed monster sculpts, a skill he's built up over time. "When you start with ZBrush there is a learning curve," he says. "The first steps are a bit uneasy if you come from other software, but once your mind is bent around how it works you will be rewarded with some fast and nice results."

Concept artist, 3D sculptor and educator Pablo Muñoz Gomez began with ZBrush around release 3.5. "I have seen it grow and mature into the beast that it is today. I feel that I've grown as an artist with ZBrush, and I use it because I think it is the key to any successful workflow in the CG world."

Guzz Soares, a Brazilian 3D artist, is a ZBrush expert who works with characters and arch-vis. He finds the toolset "very intuitive, very easy to learn and sculpt on".

But how did these artists get to where they are today? How did they take their ZBrush skills further? And how can you do the same? Verhoeven suggests that "one way to get even better is to study tons of materials and sculpt from references. The difference between a standard digital sculptor and a good one is the knowledge that the artist has on the subjects he or she wants to create – anatomy, gesture and posture from the real world."

For Guzz Soares, the key to improvement involves experimenting with as much of the software as possible. "Try to use every brush on it," he says. "This way you can see what will work better for you."

Gomez adds that taking advantage of the ZBrush community can help tremendously. "Share everything you do and ask for feedback. What's great about the ZBrush community is that they will not only give you an honest critique but often steer you in the right direction."

And expert ZBrush artists aren't just at the forefront of ZBrush tools; they are also some of the first users in the community to suggest new 'wish list' additions to the software. Soares thinks that a "more advanced retopology tool in ZBrush would be very helpful", while Gomez says he would like to be able to "optimise the UI to display correctly on hi-res monitors, have a folder structure for SubTools and layers, and it'd be great to have a 'compositor' to combine BPR passes and other effects."

Verhoeven is also eager for an "easier way to order SubTools". Still, he says, reflecting on past releases of ZBrush, "the Pixologic team always finds some new tools that are eye-openers in your workflow – things you haven't even thought of as an artist. I love those guys for this."

Wolf Knight by Richie Jon Mason

PLAN YOUR SCULPTS

SPEND TIME ON RESEARCH

Most people want to jump straight into the action and then get frustrated sculpting with no end goal or specific direction, and they end up closing ZBrush. Do your research first, note down a couple of lines informing yourself what it is you want to create and then let yourself experiment. The project will change, but having something to start with gives way to much better results.

Raul Manuel Furtado Tavares

LOOK AT EACH PART

Break everything down. So, you know what you want to do, but don't know where to start? Open your image in Photoshop, go over the concept and separate its components. Is the belt very complicated? It might actually just be two or three leather strips, buttons and buckles. Is a weapon too difficult? Try to find which forms are blending in and separate them. Taking everything back to basics and the simplest forms will be easier on your mind and eyes and will help you get started.

Hugo Sena

ANATOMY REFERENCES

If you are into characters, study anatomy but use real references.

Pablo Muñoz Gomez

USE BOOKS

I was once told, 'You are only as good as your reference'. Sculpting from your head is great, but it will only get you so far. Great and affordable books that I like are the George Bridgman books, *Strength Training Anatomy: 3rd Edition* by Frederic Delavier, and *The Artist's Guide To Drawing The Clothed Figure* by Michael Massen.

Chris Patterson

WORK ON YOUR ART STEP BY STEP

One tip I give to any artist, especially those who are beginning to sculpt, is to take things a step at a time. I see many artists who focus on one area so much and forget about the rest, and then the struggle begins. I always tell them to first fill in volumes and shapes to get the silhouette right. Then go in and start blocking out the big details, finesse medium-sized details and add the finishing small details and microdetails.

Felix E Urquiza

DO QUICK UVS

Putting a little more thought into the preparation of a model can go a long way, saving you retopology time or sculpting time. For example, laying out some quick, clean UVs and topology on a base mesh beforehand can help you while using the NoiseMaker, instead of creating or extracting meshes directly in ZBrush.

Maxence Fleuret

GO BACK TO PLANNING ON PAPER

It's sometimes better to stop and think about what you want to do before starting anything. It will help you define the guidelines of your project, what you are aiming for and your limits. Gathering references, writing a story or putting what you are thinking about on paper will help make the process real before sculpting.

Hugo Sena

WORK FROM BIG TO SMALL

Always work from macro to micro. Get your volumes and big shapes right before detailing or adding alphas.

Pablo Muñoz Gomez

PLAY WITH DYNAMESH

DynaMesh is the perfect tool for regenerating, so don't be afraid to waste the mesh while stretching it! Feel free to explore new shapes and experiment as much as possible. I used to randomly modify the mesh so as to discover new irregular patterns and forms to start my design with. It's sort of like looking at clouds and trying to extrapolate things from my imagination.

Andrea Chiampo

CUSTOMISE ZBRUSH

EDIT THE INTERFACE

Many people don't like ZBrush's interface, but I think they made it customisable enough that you can literally make your own interface and menus. Use it in your favour. I'm right-handed, so most of the brushes without shortcut menus are on the left pane. Other functions like DynaMesh, ClayPolish and ZRemesher are at the bottom of the screen. I don't have to look for them in the menus, they are readily available. Know your process and change the interface and menus accordingly. It will save you time!

Oliver Pabilona

SET YOUR OWN HOTKEYS

Creating your own hotkeys and interface is a huge help. If you think about it, how many seconds do you waste clicking through brushes or searching for the tools that you always use? If you put it all

SCULPTING A VAMPIRE HEAD

Freelance Belgian ZBrush sculptor Maarten Verhoeven takes us through the sculpting process for his incredible vampire

01 Get a base mesh ready This is a base mesh that I often use when I'm doing head busts.

02 Block in with brushes I start to block in shapes with Clay brushes and the Move brush.

03 Add in detail Next I put in some details by using the Standard brush as well as an Alpha 38.

04 Utilise the Inflate brush I use the Inflate brush to add some extra volumes and veins.

05 Change major shapes I adjust the ears, teeth and extract the cowl with a mask on the neck and shoulders.

06 Polypaint and work on details I do a quick Polypaint and refine details in the face and neck area.

07 Edit shapes This is the final overall detail run and adjustment of some big shapes on the head and cowl.

THE OPTIMUM CREATURE WORKFLOW

In this workflow example for an insectoid creature, concept artist, 3D sculptor and educator Pablo Muñoz Gomez breaks down his typical ZBrush process

01 Retopologise After I'm happy with the 3D sketch, I retopologise the model using ZRemesher with guides, the Topology brush and ZModeler for simple primitives.

04 Get UVs for texturing After the projecting of details stage has been completed, I can use UVs with the model to start the texturing process.

02 Set Polygroups Next, I will assign Polygroups to various parts of the model to use them as guides for the UV Master. This will help me to create UVs.

05 Test render When I'm happy with what I've done to the textures, I will then do a quick test render so that I can see how the textures look.

03 Project with new UVs With the detailed sketch, I project all the sculpted details into a subdivided version of the model with new topology and UVs.

06 Render in KeyShot I take the detailed model and textures into a render engine like KeyShot and create the final image. In most cases I take the render and tweak it in Photoshop.

together, you'll see that it does make a difference when it comes to speed and time saving.
Mariano Steiner

MAKE YOUR OWN IMM LIBRARY

Creating your own IMM library is very easy and can drastically improve your speed when it comes to creating fast concept iterations. Just organise your scene so that you have one library part per SubTool. Pick the orientation of each part (how you would like it to be inserted from the library) and go to Brush>Create IMM. What most people don't know is that you can unify your SubTool prior to creating the library. It helps you avoid scale issues when you are placing the parts.
Kirill Chepizhko

ESSENTIAL BRUSH TIPS

WORK WITH BASIC BRUSHES FIRST

Don't underestimate the art of learning to sculpt with only a few brushes, don't get caught up in what ZBrush can offer. Learn to sculpt, don't hide behind the tools and don't be afraid to mess up. I use only Clay, ClayTubes and ClayBuildup, you can do almost your entire sculpt with these.
Katon Callaway

DELVE INTO HIDDEN BRUSHES

There are many brushes and tools hidden inside ZBrush that aren't set to default. Use the lightbox to choose from hundreds of tools.
Richie Jon Mason

LEARN TO USE THE SMOOTH TOOLS

Make use of all of the different smooth tools, such as Sculpt brushes. There are several and not many people use them, including Smooth Stronger, Smooth groups, SmoothValley/SmoothPeaks.
Paul Liaw

USE SHIFT TO SMOOTH

ZBrush has some great Smoothing brushes which might not be obvious at first. Almost every time I smooth something I use the alternate Smoothing brush, which gets activated by pressing Shift+left-click and then letting go of the Shift key before it starts to smooth. This smoothing algorithm keeps the volumes of the sculpt much better.
Christian Fischer

WRINKLES WITH ZADD OR ZSUB

I have found that you can turn the Pen A and Pen Shadow brushes into actual sculpting tools by

turning on Zadd or Zsub and turning off Rgb. This works wonders for making nice wrinkles and cuts that feel natural.
Maxence Fleuret

PRACTISE BRUSH STROKES

Like traditional painting, it's all about the stroke of the brush. Working on hand movement and pressure is one of the key things in getting surfaces looking right within the sculpt. Practicing that movement and pressure of that stroke will improve the way you sculpt on any type of asset.
Felix E Urquiza

ACCESSORY DETAILING WITH IMM

I like to use the Insert Multi Mesh brush to help me to add accessories to the models.
Guzz Soares

WRAP STRAPS QUICKLY

The CurveStrapSnap brush is a life saver. It helps you make straps and belts that fit tightly around your sculpts quickly and easily. Just draw along your model and hold Shift to make the Curve brush wrap around your surface completely.
Krystal Sae Eua

USE BLEND MODES WITH POLYPAINT

Did you know there are blend modes for Polypaint? Go to Brush>Alpha and Texture>Polypaint Mode. It has Darken, Lighten, Multiply and Colorize modes, which can be great for some quick tweaks to the Polypaint!
Katon Callaway

STRENGTHEN YOUR WORKFLOW

KEEP IT SIMPLE

I would say that the biggest tip that has helped me in my career is keeping things simple. Learn a few processes and use a small set of brushes that work for you, and get busy making art. It's very easy to get intimidated by all the amazing work that is out there. Don't feel you have to be an absolute expert in the program to get similar results. ZBrush has a multitude of tools to offer artists, but it is also set up in a way where you can keep it simple and get incredible results.
Mark Van Haitsma

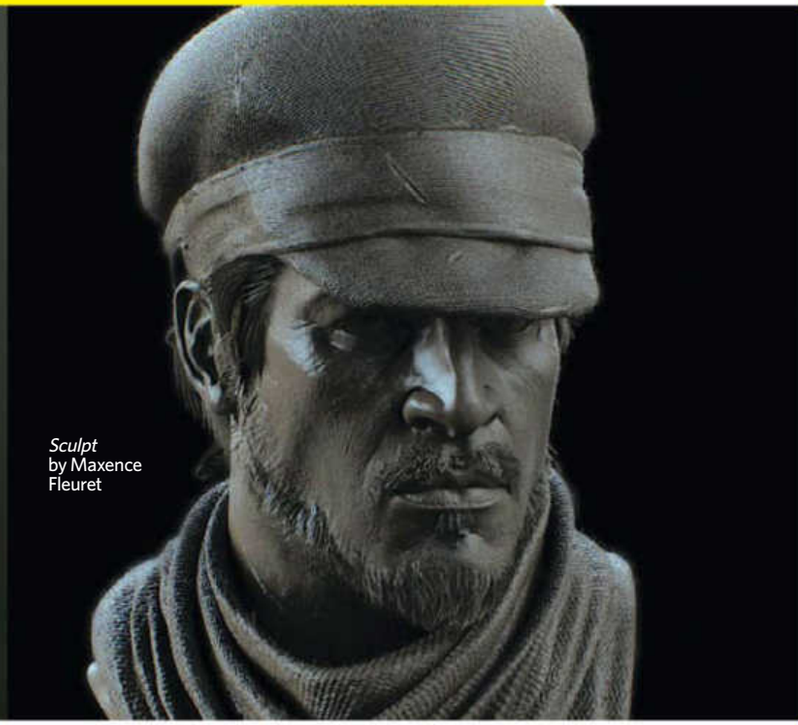
WORK ON THE SILHOUETTE

During the sculpting process, I sometimes change the material to Flat Color so I can focus on the silhouette (I consider this a very important step).
Guzz Soares

Native Girl by Guzz Soares

The Punisher by Tyler Wilson

Hellcat by Maarten Verhoeven



Sculpt by Maxence Fleuret

GET A SMOOTHER MESH

Under Tool>Geometry is the Dynamic button, which can be used when you are doing faces and starting off with a low-res base mesh. It means that I don't get distracted by looking at individual polygons since the mesh looks smoother, which enables me to focus on forms in the early stages. This helps me get the likeness right a lot easier.

Christian Fischer

RESET SUBTOOL MRGB WITH FILL

You can reset your SubTool Mrgb by toggling it on and doing a Fill or FillObject with the Flat Color shader in full white.

Tyler Wilson

USE A SMALL SELECTION OF BRUSHES

The number one question that people always ask is "What brush are you using?", as if there is a magical 'make art' brush. The truth is, 90 per cent of my work is done with four basic brushes. The Standard and Move brushes are fine for pretty much anything, I use ClayTubes to build up larger shapes by following muscle direction and flow, and the Clay brush does the same for secondary shapes and gives a more organic feel to the sculpt by introducing some imperfection.

Maxence Fleuret

CREATE BRUSH PRESSURE

If you don't have a tablet and are using a mouse, a good way to simulate pressure is to use the LazyMouse under Stroke.

Richie Jon Mason

SCULPT WITH SNAKEHOOK

Use SnakeHook with Opt/Alt and your mesh will follow the surface. This is very useful if you are sculpting hair, for example, and you need to adjust it to the body or the head.

Alejandro Pereira Ezcurra

START WITH LOW POLY

Don't rush through the basics and don't underestimate low-poly geometry for building your initial shapes. The less you focus on detail the more you can focus on design language. Start with a low-resolution DynaMesh (32) and build things gradually (slowly but surely) in the same way you build a house – from the ground up.

Raul Manuel Furtado Tavares

LAYER PASSES

Layers are essential to my workflow. I tend to do several passes of detailing using layers because they are easy to alter after feedback. I keep a clean, undetailed version of my mesh that can be really useful in the baking process to extract different levels of details and maps for texturing.

Maxence Fleuret

QUICKLY CREATE POLYGROUPS

Become an expert at making Polygroups fast and creatively by using basic stuff like brushes, connected pieces, UVs and also the extensive options in ZModeler for selection. Having flexible control over every bit of your model is one of the main cornerstones of speed/accuracy.

Paul Liaw

MAKE YOUR OWN ALPHAS

Remember sculpting your own alphas whenever is necessary, and grabbing them with the MRGBZgrabber. After a while, you'll have a big brush/alpha library that will make your life easier.

Mariano Steiner

AFFECT ONLY ONE SIDE

If you have a very thin mesh, when you add or subtract your mesh, both sides will be affected. With the backface mesh activated, only the side you are working on will be affected. You can find it under Brush>Auto Masking>BackfaceMask.

Guzz Soares

WORK WITH AN OBJECT OUTSIDE OF TRANSPOSE

Using Transpose, if you hold Opt/Alt and pick your mouse in the object you can move or scale it outside the rule of the Transpose.

Alejandro Pereira Ezcurra

COMPARE TOOLS

Shift+S will let you take a snapshot of your current tool so you can compare details to another ZBrush version or with ZTool. This is especially helpful when clients or art directors stop by and want to see different versions of a model on your screen.

Krystal Sae Eua

FIND SYMMETRY EFFORTLESSLY

Sometimes when trying to use Smart ReSym to mirror one side of the mesh to the other side,

Cyberchimp
by Kirill Chepizhko

ZBrush is not able to find 100 per cent of the symmetry even though the mesh has been built symmetrically. You can simply activate Symmetry, click on Use Posable Symmetry and ZBrush will be able to find full symmetry again.
Christian Fischer

BOOST YOUR DETAILS

BETTER SURFACES WITH ZSKETCH

A special ZSketch trick is using the Project option when the base model structure is finished and a new mesh from the ZSketch will be created. It transfers unique organic bumps from the ZSketch to the new surface and makes the surface more interesting. It helps you realise the direction of further shape building and detailing of the object.
Alexey Kashpersky

ADD GRAVITY TO POSES

A different thing I like to do is to add gravity to my organic sculptures, especially when posing them. Select the Move brush and pick a Z-intensity of 1 and use a very large draw size. Now do some strokes over your model from the top to the bottom. When you do the strokes gently you will see that a certain amount of weight will be created in the model. You will get the feeling that it is really standing on its feet. This can also be applied on faces or body parts, depending on the body type you're creating.
Maarten Verhoeven

SPEED PAINTING IN ZBRUSH

Brazilian 3D artist Guzz Soares explores the process behind his speed paint of Girl, based on concept art by Julio Cesar

01 **Sculpt the face** I start to sculpt from a sphere, using Move and ClayBuildup. I create three planes, separating the eyes and forehead; I will add the nose and mouth later.

04 **Create hair strands** I use the CurveLineTube brush, where I can draw a cylinder over the mesh. Then I just need to use the Move brush to get the form that I need.

02 **Check planes** A good exercise is to study the planes of the face. With that, you can check if the structure of the face is correct or not.

05 **Utilise Dam_Standard** Finally I add in the other elements and start to work on cloth folds by making use of the Dam_ Standard brush.

03 **Smooth and sculpt** After that, I will work on smoothing out the face and start to sculpt all the elements including the mouth, nose, eyes and ears.

06 **The final render** Once I have the basic sculpt, I start retopologising. I used 3ds Max to model props such as the nose ring and the final render was done in V-Ray.

PUT IN A TEXTURE MAP FOR DETAILS

I love using a texture map to enhance my details. When you apply a texture and mask by intensity, you can easily extract fine details by using the Deformation>Inflate slider. Make sure to use layers and morph targets and you will be able to easily paint out portions of the detail extracted.
Krystal Sae Eua

USE A CAVITY MASK

A simple trick to get the maximum out of your sculpted details like pores and wrinkles is to use a Cavity Mask. Use this masking setting to mask off all the deeper details and wrinkles. Than go to the Deformation tab and use the Inflate slider. Just add a low value like 0.05 depending on the details of your sculpt. You'll notice that all the details will now pop and be more sharp.
Maarten Verhoeven

BACK TO BASICS

WORK ON CORE COMPONENTS

Silhouette, shape, form, flow, contrast (big vs small, curves vs straight) and so on – these are the things that are single-handedly responsible for either destroying a design or making it an incredible one. Always stop and step back from your sculpt to see where you're at. Watch your forms and how things flow into one another. Ask yourself if the design looks appealing. Does the character read well close and from a distance? If the answer is no then don't be afraid to break your sculpt and address some of these things.
Raul Manuel Furtado Tavares

UNDERSTAND DETAILS AND FORMS

Learn the three levels of details and forms. The primary form, silhouette, is what you see from afar. This is usually the part that's taken for granted and yet this is the level of detail that talks to your unconscious. Secondary details are things like eyes, mouth and nose, and tertiary details include skin pores. This approach gives you a list of guidelines that could be applied on anything that you are going to create. Listing things to do streamlines your process, thus helping you to oversee the entirety of your creation process.
Oliver Pabilona

BALANCE YOUR WORK

Crash the symmetry. Balance your skills. It's important to have a good balance in your portfolio (male, female, portraits and hard surfaces for example). Your portfolio is as good as your worst sample – this may be sad but it is true.
Alejandro Pereira Ezcurra

Elf by Katon Callaway

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Sculpt a sci-fi space suit with ZModeler

FREDERIC DAOUST
A.R.A.C.H. Space suit, 2016

Software
ZBrush, KeyShot, Photoshop

Learn how to
- Design characters
- Use ZModeler
- Model dynamic subdivisions
- Render in KeyShot

Concept
I wanted to design a sci-fi suit with a high level of detail that would hold up in a close portrait frame. *Starcraft II*'s Kerrigan was one of my main references for this piece.

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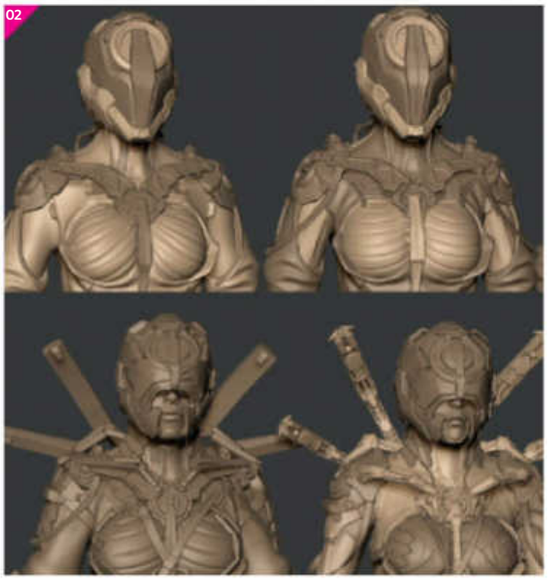
- KeyShot 6 shaders
- Tutorial screenshots

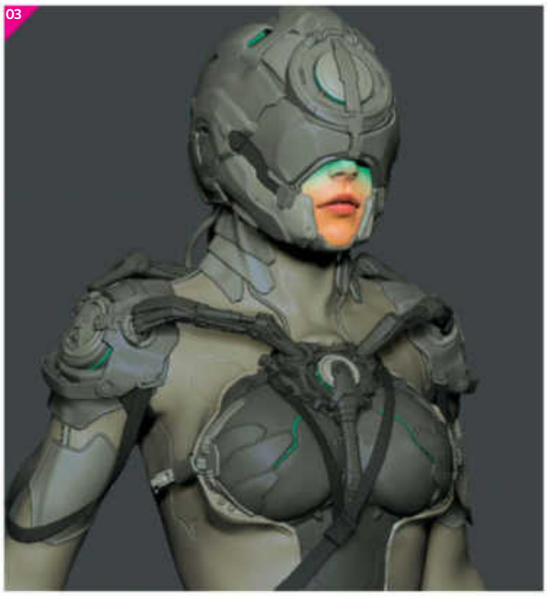
An interesting sci-fi suit can be created by using different techniques and tools inside ZBrush. We are going to cover all the steps from the early 3D sketches to how to use ZModeler in conjunction with traditional ZBrush sculpting techniques to achieve a clean and highly detailed final model. We are also going to quickly learn how to set up the final model in ZBrush to create the final render in KeyShot. We're going to finish by learning how to composite the final render in Photoshop and how to enhance it to create a nice-looking final image.

01 Sketch out the design and use IMM When you start a new 3D design project, one of the things that you really need to do is to be very loose with the sculpting process. You can start by appending a couple of random shapes and parts from IMM brushes, and push and pull to try to stumble upon shapes that you like.

02 Refine the design Once you start to get an idea of what you are going to do with this design, you can try to isolate a couple of shapes and design ideas that you like and try to repeat them throughout the whole character. This is an ongoing process that can change and evolve during the creation of the piece. At this point, it's important not to start refining the model and really focus about the piece as a whole. Silhouettes should be the main focus at first.

03 Balance the design with values While working on your design, you're going to want a good balance between the areas with a lot of details and the areas with less details. Then start adding some values to your model using Polypaint. By doing this, new shapes will be created that are going to help define the balance of the whole design.





Focus on the design as a whole
While working on your design, it is really important not to focus on polishing the model too much since there's a good chance that the part that you are working on won't make it to the final design. The main brushes that you'll probably use when sketching in ZBrush are mainly the ClayBuildup as the main shape-building brush, the hPolish brush to flatten and polish some of the pieces and the Dam_Standard to sketch the smaller details.

"Start by appending a couple of random shapes and parts from IMM brushes, and push and pull to try to stumble upon shapes that you like"

04 Colour test in KeyShot Once you are happy with the overall design of your piece, it is a good idea to test what the colour scheme of your model will be. To do that, you can use your Polypaint to apply different matcaps on some parts of your character and then bring the model into KeyShot for a quick colour test. It's a fast and fun process that is going to give you a better idea of what your final image will look like.

05 Polish the under armour Once you have a clear idea of what your final model will look like, it's time to start polishing it. To polish the under armour, start masking the whole part of the sketched mesh. Then split the masked area and ZRemesh it to a lower polycount. You then need to add thickness to the new mesh you just created using the ZModeler with the QMesh/island setting.

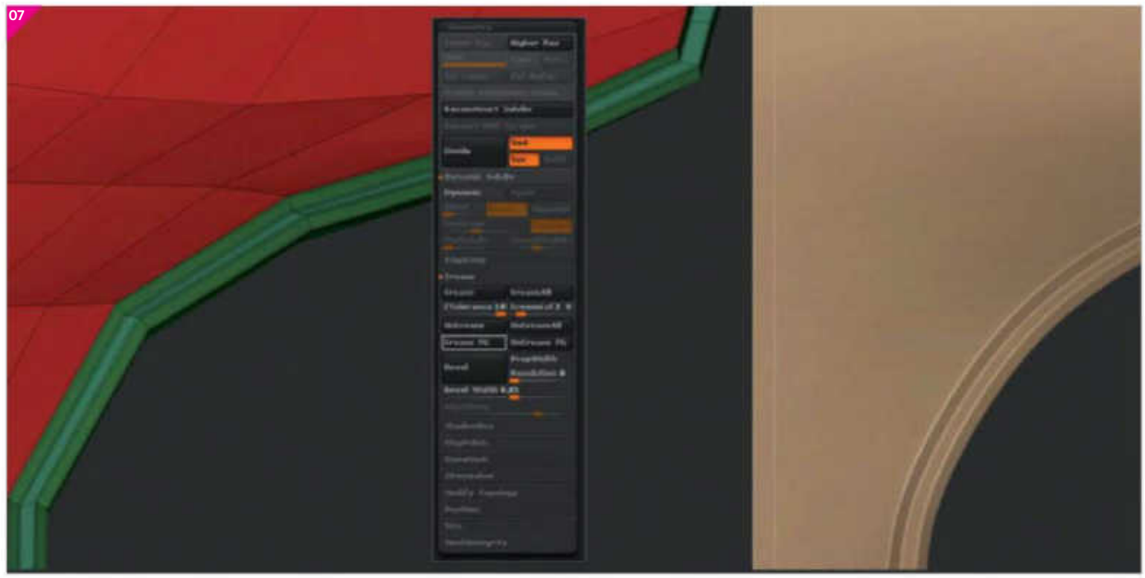
06 Detail using the ZModeler brush Now add a couple of details to the edges of the model by adding some EdgeLoops using the ZModeler Insert brush and EdgeLoop setting on the edge of the mesh. Then add another small extrude to the border using the QMesh feature again with the EdgeLoop setting.

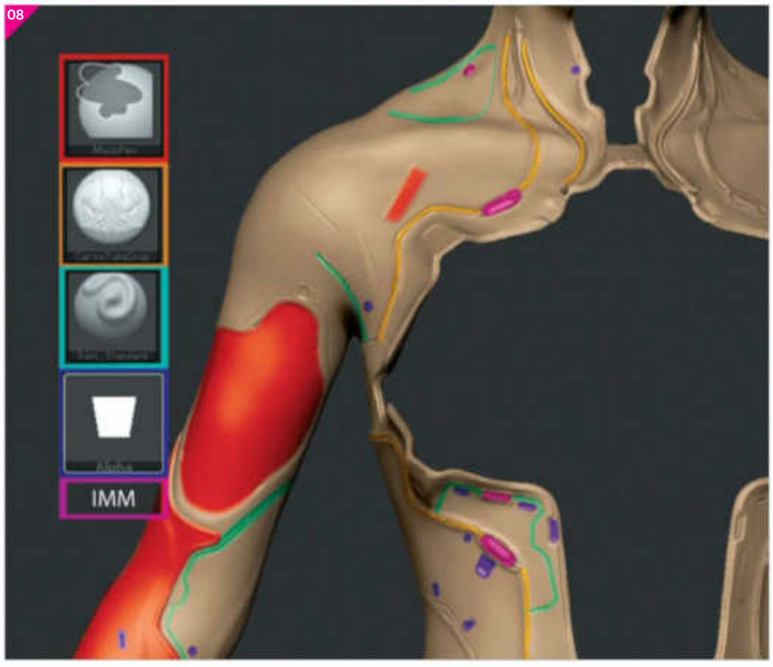
Being smart when adding details

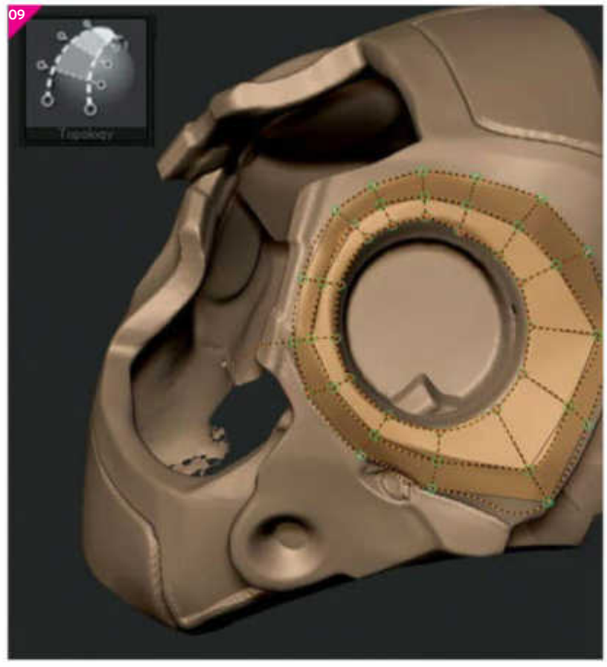
A trick for adding lots of details on a mesh without making it busy is to refrain from adding big shapes on the surfaces. Try to add these details on the sides of the meshes or, if you add it on the surface, make it small and subtle. Ensure you check your model as a whole often to make sure you are not overdoing it.

07 Dynamic modelling

When we model using the ZModeler brush and the Dynamic Subdivision feature, we usually play with the Polygroups and the Crease feature. We place different Polygroups at the intersection of all the edges that we need to stay sharp, and then use the Crease By Polygroups feature to add a crease to all those edges. You can then play around with the Crease number and the Dynamic Subdivision level to get a sharper or smoother edge.





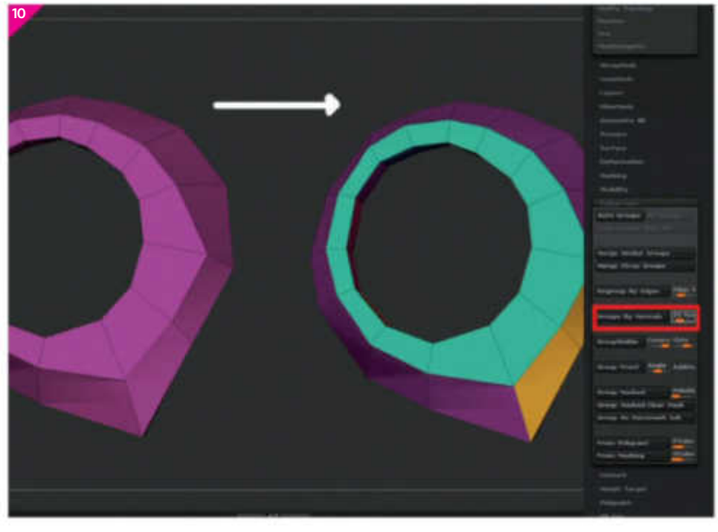


08 DynaMesh with high polycount

Once you have a clean mesh with clean and detailed edges you need to DynaMesh the whole piece with a high-density polycount to start adding the surface details. To do so, it's usually a mix of masking and pushing/pulling to add extruded details using the Dam_Standard or Orb Crack sculpting brush to sculpt fine lines and a bunch of alphas to add details.

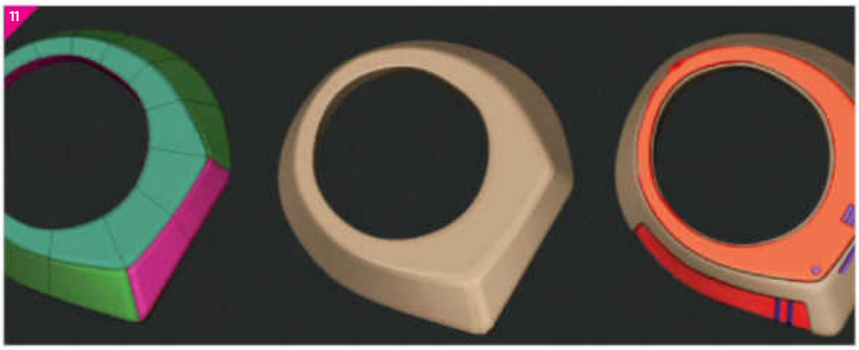
09 Retopo parts to build final model

So now it's time to redo those last steps for the other parts of the model. The ZRemesher worked perfectly for the under armour, but for pieces like armour plates you really need to retopo them properly to have your edges in exactly the right place. For this you can use the Topology feature of the ZSphere or the Topology brush.



10 Polygroup By Normals

The fastest way for you to set your Polygroups is to first start by using a feature called Polygroup By Normals that will automatically assign Polygroups to all the faces of your mesh based on the angle of the faces. Set it to 20 or 25 degrees and this will give you a pretty good base for you to start working on. Use the ZModeler brush to fix any remaining Polygroups.



Using ZModeler together with IMM brushes

ZModeler works really well in conjunction with IMM brushes. Make sure that you have some good IMM brushes with some low-poly shapes to append on your model at any time. You are going to be able to use them as base meshes and you can then modify these shapes with the ZModeler brush. Some great IMM brushes can be found in BadKing's 3D Creation Kit brushes.

11 Polish the entire model Now you will have to redo the same steps as the under armour for every other piece. So first, add thickness using the ZModeler brush and set all your Polygroups properly to every edge that you need to be creased, click on Crease By Polygroup and then turn on Dynamic Subdivision. Then add details to the mesh with the ZModeler brush where necessary, convert to a high-density DynaMesh model and finally sculpt details with alphas and the Mask Transpose or Inflate function.

12 ZModeler modelling You can also build some parts with ZModeler entirely. This is a cleaner but more time-consuming way to build models. We like to use it mainly on very mechanical parts like the centre part of this model. Let's start with a regular DynaMesh sketch of what we want to build and then rebuild the whole piece with ZModeler using the sketch as a reference.

13 Split the model for KeyShot Once your model is completed, it's now time to apply different materials or matcaps to the mesh. The reason for doing this is that we will use the material information to split the mesh in KeyShot using the KeyShot Bridge. Since we already did some tests in KeyShot earlier, we already have a good idea of what type of material split we want to achieve. Before exporting into KeyShot using the Bridge, you will need to turn on the Split By Materials option in the Render tab.

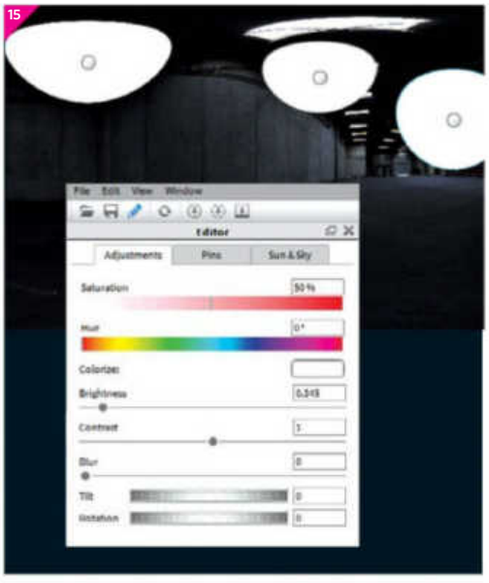
> Add thickness using the ZModeler brush and set all your Polygroups properly to every edge that you need to be creased

14 Create procedural shaders in KeyShot In KeyShot 6, there is a new Material Graph Editor that enables us to create some more complex procedural materials using curvature and ambient occlusion as a mask. For this character, we have created a scratched painted metal material using the curvature to damage the edges and added some dirt in occluded area using the AO as a mask. We also added some procedural noise in the gloss and diffuse slot of the paint material to add a bit of realism to the material.

15 Light your character To light the character, start with a real-life photo HDR map that has some nice colours and lighting information. This map is used with a very low intensity just to get some subtle colour variations in the lighting and some nice reflection details in the reflective materials, eg chrome. Now, add three lights manually to the HDR using the KeyShot HDR editor to create a three-point lighting setup. Start with the rim light, then add the fill and the key light. To add light to the HDR map, you simply use the Add Pin feature in the HDR editor and click directly on your model while pressing Ctrl/Cmd where you want your light to reflect.

Double-check before posting

Before posting your final image online, it's always a good idea to check your image on different monitors and smart devices to be sure that your image has a good brightness and to check on your values. I have three monitors at home and all of them have a pretty big difference in contrast, brightness and colour, so I make sure to check the final render on the monitor or device that I know is the most neutral of them all.



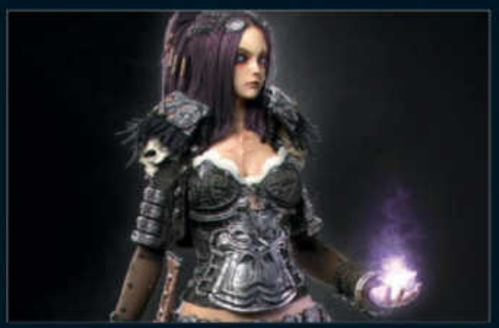
16 Final touches in Photoshop Once your render is done, adjust the image in Photoshop. First adjust the contrast/brightness if needed, add the background image (usually this is any environment picture that has the colours that you need and can then blur). You can then add some decals on the model if needed and then add some subtle camera dust effects, lens flare, more blooming, some glare and so on. Once you're done with all that, you can collapse the whole image and add a subtle coloured camera filter to unify the final image.

Showcase

Frederic Daoust

Frederic is a 3D character artist who has been working in the videogames industry since 2013. He is currently working at BioWare Montreal and has been working on projects like *Mass Effect: Andromeda*, *Doom*, *Tomb Raider* and *Deus Ex: Mankind Divided*.

Exomancer
ZBrush, KeyShot, Photoshop (2015)
This character was created during preparation for the ZBrush Sculpt-Off 2015. This is one of the four-weekly characters that was created to practise speed.



Dark witch
ZBrush, Photoshop, Quixel, 3ds Max, V-Ray (2014)
The bust of this character (created by Kenju Kim back in 2013) was sculpted. A year later, Frederic decided to finish the model and use it to learn V-Ray.

Time-Mage
ZBrush, Photoshop, Quixel (2015)
This character was also created during the preparation for the ZBrush Sculpt-Off 2015, alongside the 'Exomancer' shown above and two other characters.

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JAMES SURET
Criostail the Dragon, 2016

Software

ZBrush, KeyShot, Photoshop

Learn how to

- Use ZSpheres to create the basic form of a creature
- Use ZSketch to build up rough anatomy
- Use DynaMesh to progressively increase detail
- Use Insert Multi Mesh brushes (IMM brushes) to build features
- Pose the creature using masking and the Transform tools
- Create multiple render passes to create a high-quality final image
- Render the model using KeyShot for ZBrush

Concept

The aim of this project is to create a unique, detailed and expressive dragon along with a fitting environment.

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- Tutorial screenshots

Use ZSpheres to sculpt a dragon

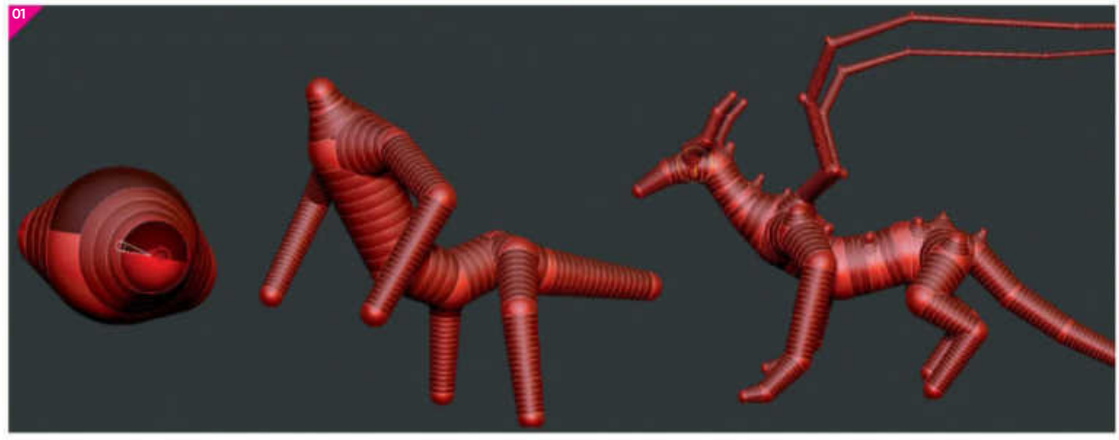
Combine a ZSphere skeleton and ZSketch to create a dramatic render of a dragon with unique features

Making a posed and detailed dragon will require the rough form of the dragon to be built up using ZSpheres. We will also make use of readily available Insert Multi Mesh brushes to add features to the creature. Renders will then be taken into Photoshop to finish the composition by adding lighting effects and textures. Finally, we will also cover how to export and render the model in KeyShot from ZBrush 4R7.

01 Start from ZSpheres To start, click on the Tool palette and choose ZSphere. Draw the initial ZSphere out and press T then X to start editing with symmetry. You can then start adding further ZSpheres after pressing Q; using W, E and R will let you move, resize and rotate the ZSpheres. You can start from the chest of the character and then add the arms, spine and legs. Don't worry about detail or muscular forms at this stage – concentrate on creating the skeleton of the dragon first before doing anything else.

02 Use ZSketch to build up the anatomy When you are happy with the way the skeleton looks we can start to add volume and muscular forms. Click on EditSketch under the ZSketch section and press Q. You can now paint geometry directly on top of the skeleton. Using the [and] keys you can change the size of the geometry added. Shift can be used to smooth out the lines of geometry and Opt/Alt+click can be utilised to remove geometry. The idea is to build up the anatomy of the dragon by adding layers of muscle. For reference you can look at images of tiger or horse anatomy.

03 Turn the ZSketch in to a model To transform the ZSketch into a useable model click on Make Unified Skin under the Unified Skin section. The resolution of the geometry can also be set before doing this. This will create a new tool with the text Skin_ before its name. Now turn off EditSketch to go back to the ZSphere skeleton. Click Make Adaptive Skin under the Adaptive Skin section and this will create another tool. Under the SubTool section, click Insert and pick the two new tools created. Next delete the original ZSphere SubTool and then click MergeDown under the Merge menu of the SubTool section.



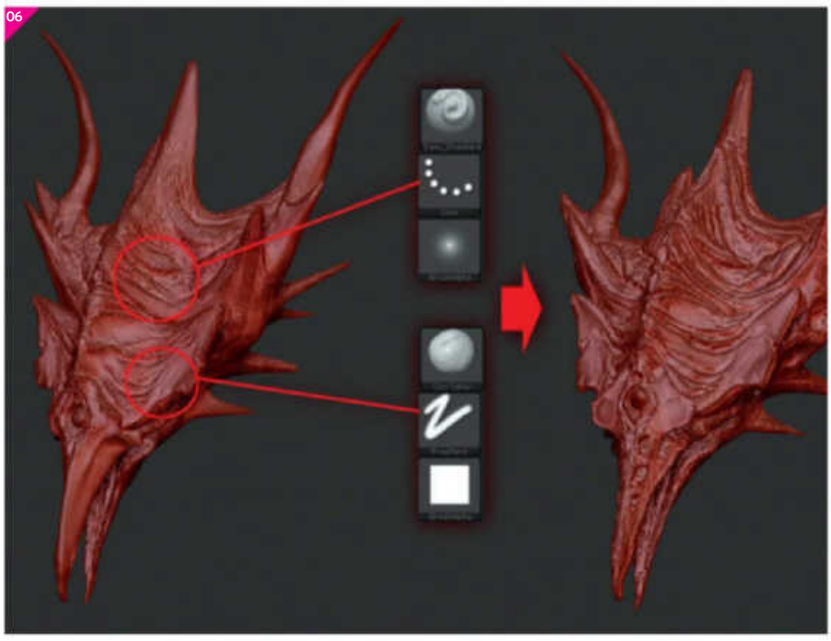
04 Develop the model using DynaMesh Now we have a very rough form but the mesh is difficult to sculpt because of its topology. The DynaMesh feature needs to be used to even out the surface of the model and increase its resolution. We can then continue to pull out the basic form of the creature. Whenever it feels like the mesh is stopping you from adding more detail just use the DynaMesh feature again, but with a higher resolution. At this point the polygon count is not too high and we can begin using the Move and Clay brushes to work on the larger form.

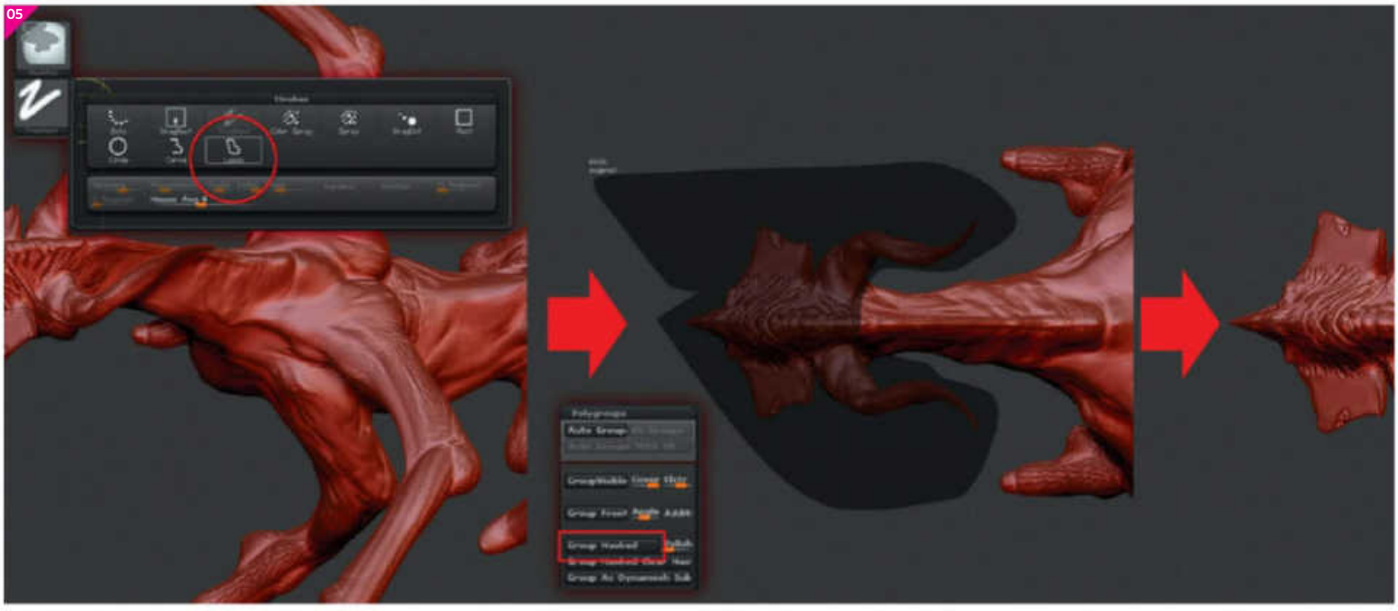
05 Work with Polygroups Now the model is starting to get more complicated we need to separate parts off in order to sculpt them easily without affecting the rest of the model. Hold down Cmd/Ctrl and click on the stroke icon under the Brush palette then click Lasso; now you can draw out a very accurate mask around the head. Next, click Group Masked under the Polygroups menu. Now when you hold Cmd/Ctrl+Shift and click on the head it will hide everything else. To make everything visible again hold Cmd/Ctrl+Shift and click outside of the model.

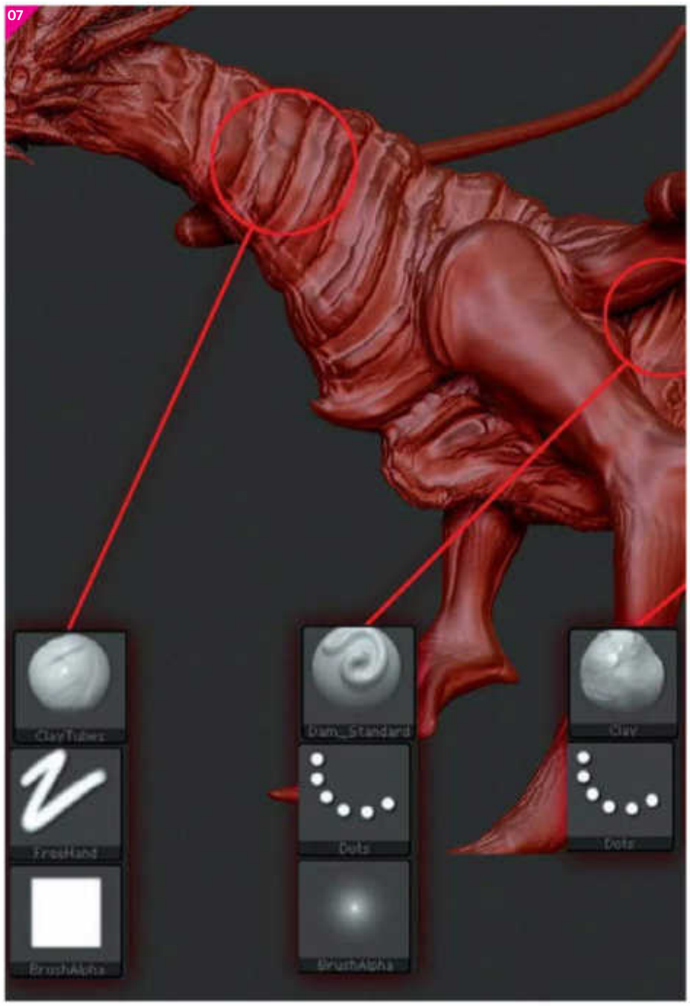
06 Focus on the head Next we can start adding some detail to the head using the Dam_Standard brush. This will help us to easily create skin folds and nostrils. The ClayTubes brush and the Smooth brush are great for building up muscle fibres and organic forms. The Pinch brush can be used to pull skin folds and wrinkles closer together.

Sculpting with Alphas

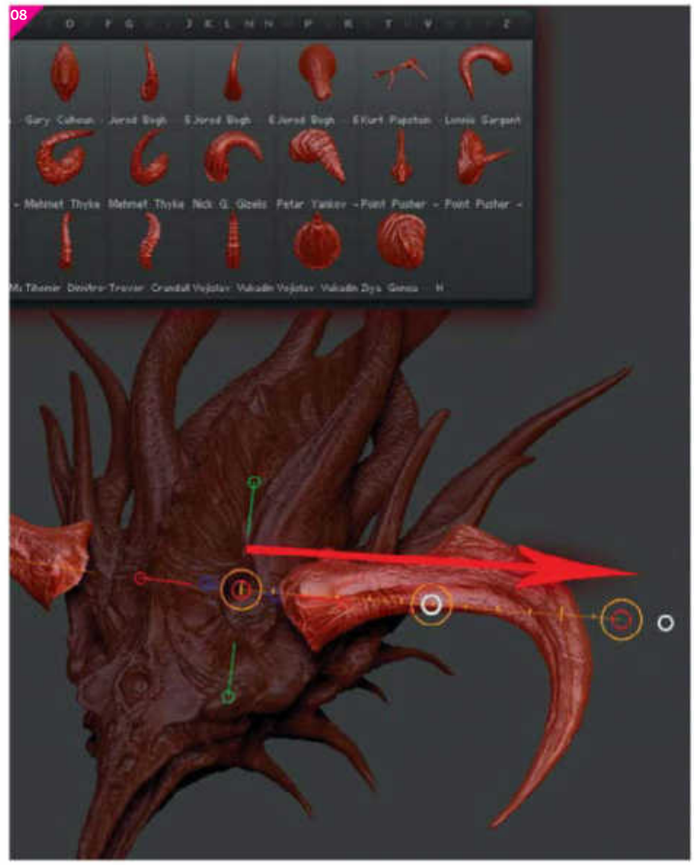
Usually to make large changes to your model you will use the Move or Clay brushes along with the Smooth brush. Sometimes it might be faster to sculpt large areas of your model using the Standard brush with an Alpha material selected. You can experiment with the Alpha materials that come with ZBrush or you can create your own in Photoshop. Make sure the image is greyscale and save it as a PSD file. You can then load the file into ZBrush and use it with a brush.

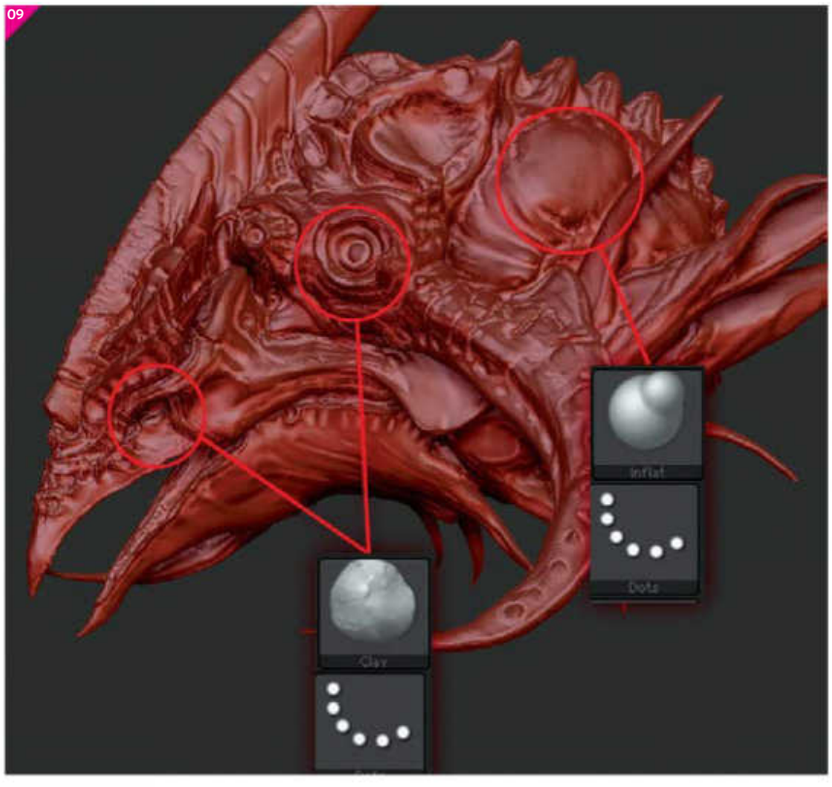






> The ClayTubes brush and the Smooth brush are great for building up muscle fibres and organic forms





07 Sculpt the body Now we can continue to add more detail to the body. The ClayTubes and Dam_Standard brushes can be used to carve out bone features and the Clay brush can be used to build up large smooth organic forms. To create the rough shape of the spine you can use the Pinch and SnakeHook brushes to pull out geometry quickly.

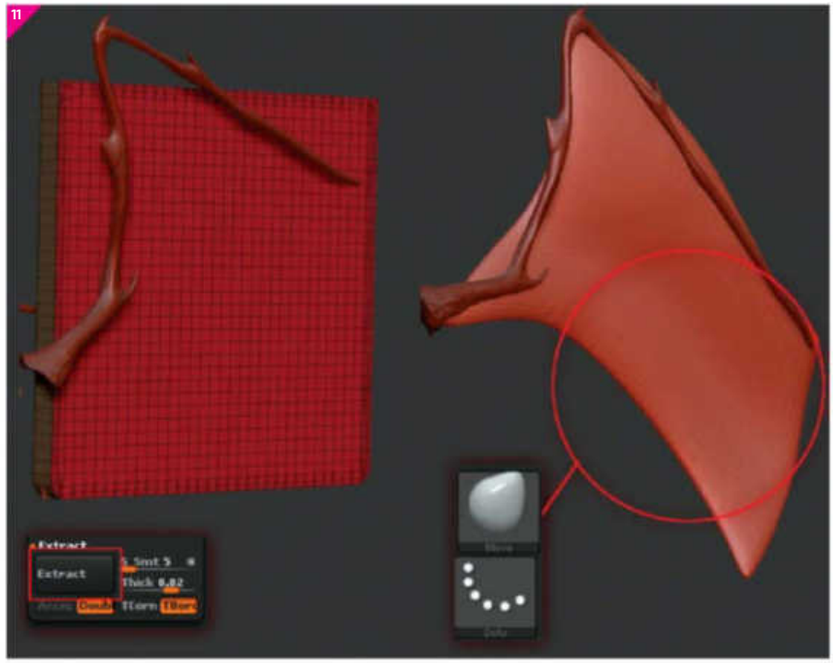
08 Use Insert Meshes to add features Next, we will add some horns to the dragon. To speed up this process we can utilise a premade horn from the Monster Horns & Antlers brush pack available for free at **badking.com.au**. Once the brush set is loaded you can click on the side of the head and drag out the desired size of the horn. Then use the Transpose tools to position it. You can now reshape and sculpt the horn with the usual brush methods to tailor it to your character's design.

09 Refine the head One of the benefits of using Insert Meshes is that they will automatically have their own Polygroup. You can then hide the Polygroup by holding Cmd/Ctrl+Shift and then clicking on the object. Now concentrate on sculpting more detail to the face and the area around the horns. You can build up the areas around the horns to make them seem much more natural in appearance. A quick way to sculpt the eye sockets is to hold Opt/Alt and use the Clay brush to dig a circular space into the head. The Inflate brush is good for adding gradual volume to organic forms.

> Use DynaMesh to smooth out the mesh and increase the polygon count for sculpting finer details

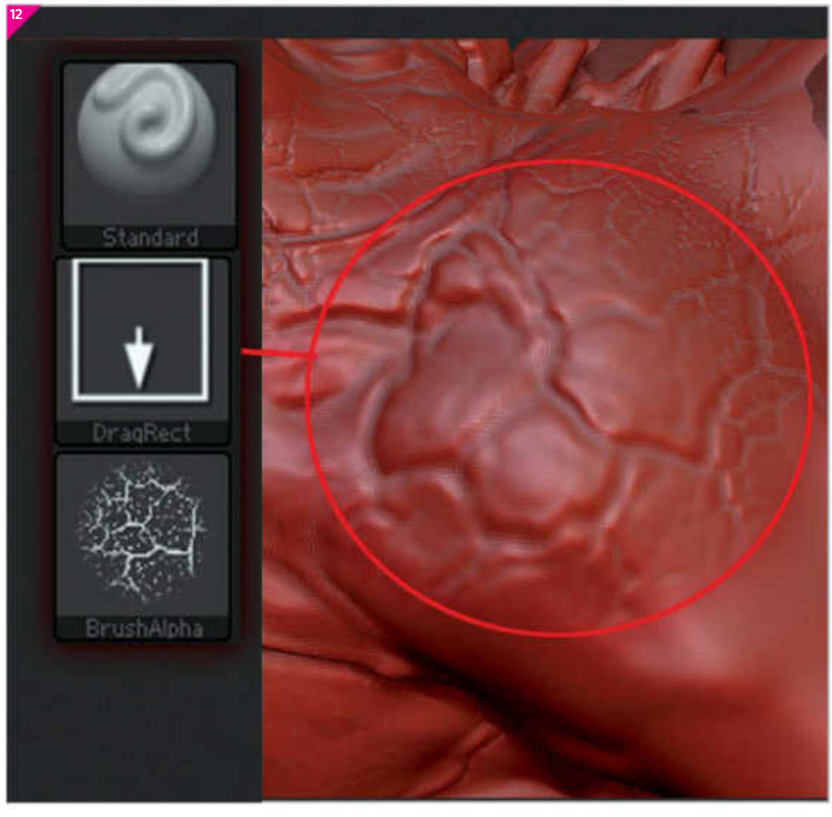
Pose organic forms

When posing organic characters you need to create smooth bends – for the neck or knees, for example. When you are painting out a mask you can hold down the Cmd/Ctrl key and lower the RGB Intensity which will draw out a softer mask. This will help create smoother, more organic bends. You can quickly blur the whole mask by holding Cmd/Ctrl and clicking on it several times. The Masking menu has options to shrink and grow the mask too.



10 Create the spine's scales Insert a new sphere to create the large scales that will cover the spine. Then, using the Move brush, you can pull out the rough shape of the scale. Use DynaMesh to smooth out the mesh and increase the polygon count for sculpting finer details. Next, use the Transpose tool to draw out a line away from the scale, hold Cmd/Ctrl and drag the transpose line from the centre point. This will duplicate the object; you can do this multiple times and move or rotate them as you do so.

11 Create the wings We now need to add more skin to the wings as we only have the bone structure. Insert a Plane3D SubTool, then press Extract under the Extract menu. Next press the Accept button underneath and this will create a new SubTool called 'Extract1'. Delete the original SubTool and select the new one. Using the Move brush you can now shape the plane around the bones of the wing. When you have finished with the shaping, click on the SubTool Master menu under Plugins and click Mirror to create symmetry. Then merge the SubTool with the wing bones' SubTool and use DynaMesh; this will weld the skin onto the bones and allow us to achieve a more organic look.



12 Add surface details After using DynaMesh again at a higher resolution you can now add fine details such as skin folds and lumps. If you use the Standard brush set to DragRect with an Alpha material you can draw out large details in one stroke. If you change DragRect to Spray and brush over the model it will create smaller and more random details. This is more natural looking so it's good for sculpting organic features. To add crystals to the dragon's shoulders load the brush pack Gems & Diamonds from **badking.com.au**. Click on the point furthest away on the Transpose line and stretch out the shape of the gem to sharpen it.

13 Create the base and posing Next we can create a base for the dragon to stand on. Insert a sphere and use the Move brush to shape the sphere into a rough rock. Use DynaMesh to increase the polygon count and create a more even mesh. The Flatten brush is good for creating the flat sharp surfaces of the rock. Now let's pose the dragon on top of the rock base. By holding down Cmd/Ctrl and brushing the model a mask will be created; clicking off of the model will invert the mask. You can change the strength of the mask by changing the RGB Intensity. Next draw out a Transpose line and rotate from the transpose point at the end of the line – repeat this process for the arms.

14 Lighting and rendering First rotate the model to create an interesting composition. Move the light placement by moving the dot around the sphere under the Light menu. Set the shadow resolution to 8,000 on the BPR Shadow section of the Render menu to create higher quality shadows. Enable Ambient Occlusion under Render Properties and set the resolution to 8,000. Click BPR render and save all the render passes. To create a specular render fill the model with ToyPlastic material and black colour. Finally, create a clown pass render to help select individual parts of the model in Photoshop. Fill each SubTool with the flat colour material and fill each part with a different colour, then render this out.

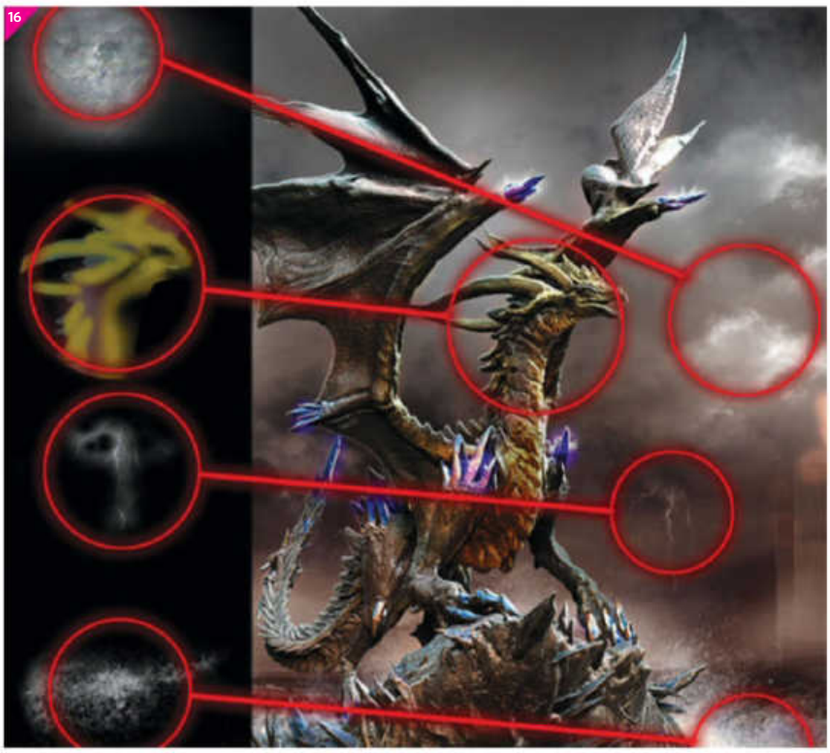
15 Composite the layers in Photoshop After saving the renders as PSD files open them in Photoshop and layer them up. First is the main BPR render, followed by the AO layer set to Multiply – this helps add more depth to the render. Next, set the Specular layer to Lighten which brings out highlights along the skin. Finally, set the Shadow layer to Darken to enhance the dark areas. The mask layer can be used to delete the background of the renders to enable you to place the background render behind the character.

> "Use DynaMesh to increase the polygon count and create a more even mesh"

Paint in 3D or 2D?

If the character you are creating is going to be used for animation or imported into a game engine it might be best to Polypaint the textures onto the model. However, if the end product is going to be a flat image used for illustration or concept art, you can save time by taking the render into Photoshop and painting textures on top of it. Also, the more detail you sculpt onto the model itself, the less painting you will need to do later.

16 Add effects and textures To create the background insert stock photos of clouds and water splashes. Using the Clone Stamp tool you can paint these extra textures on different parts of the image quickly. A great selection of free photo textures can be found at **cgtextures.com**. Finally, using a soft brush add some soft lighting and glow effects to the crystals, eyes and claws. This emulates reflected light and adds to the atmosphere of the image.



17 Render in KeyShot Rendering is now easier than ever in KeyShot with ZBrush 4R7. Simply load your model as normal and click on the External Renderer button under the Render menu, then hit the BPR button. The model and all of the textures and materials will be sent to KeyShot. If you want to create a realistic clay render you can apply one of the clay materials that comes with KeyShot. For more realistic lighting load one of the HDR environments and set the Background to Color and choose a light colour. You can also rotate the lighting by using the slider underneath the Environment tab. When you are happy with it, press Render and choose your resolution.

Choose the right view

Whilst you are trying to decide on the best camera angle for your final render it is beneficial to consider the Rule of Thirds or the golden ratio. Render out a camera angle that you like and simply overlay an image of the golden ratio (take a look on Google for imagery). See if the main features of the image match up with the centre of the spiral and adjust the camera angle accordingly.

Showcase

James Suret

James is currently a full-time web developer and freelance 3D artist. He is constantly developing his portfolio with the aim of working as a concept artist in the games/entertainment industry. His main focus is creating original creatures and illustrations.

Relic Seeker
ZBrush, Photoshop (2013)
An alien elder observes his navigational device in search of ancient artefacts. This was created using DynaMesh and Insert Meshes.

Relic Scavanger
ZBrush, Photoshop (2014)
A team of aliens use their mechanical vehicle to find ancient relics. Created using Insert Meshes and DynaMesh, the Curves feature was used to create the pipes and tentacles.

Tridecca
ZBrush, Photoshop (2014)
Clay render of an insect-inspired creature. This was made in ZBrush using DynaMesh and was created for a personal project for practice.

"The fastest and easiest way to texture"
- Simon Fox, Blizzard

"Holy shit this is bad ass"
- David Lesperance, Valve

"An essential part of my pipeline"
- Josh Marlow, Epic

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Render without plugins in 3ds Max and V-Ray

> “There are perfectly satisfactory tools within 3ds Max and V-Ray that enable users to get very similar results to paid-for plugins”

This 3D visual was created using only 3ds Max and V-Ray. There were no other external plugins utilised for any of it, and that includes the grass and trees. All of the post-production was done using all of the tools found within the V-Ray Frame Buffer. It's not always financially viable for studios or freelancers to spend money on all the latest plugins and pieces of software so it's good to try and find alternative ways of doing things. There are perfectly satisfactory tools within 3ds Max and V-Ray that enable users to get very similar results to paid-for plugins.

In this tutorial we will explore some of those features such as Particle Flow (PFlow), VRayInstancer and V-Ray's post-production tools including V-Ray Lens Effects.

PAUL HATTON
Graanmarkt the apartment, 2016

Software
3ds Max and V-Ray

Learn how to
- Use Particle Flow
- Master the VRayInstancer
- Colour correct in V-Ray
- Add V-Ray Lens Effects

Concept
I love warm grey tones and was keen to bring a richness of colour to my artwork for this project. I focused, therefore, on a small range of colour tones that would complement each other and bring the whole scheme together.

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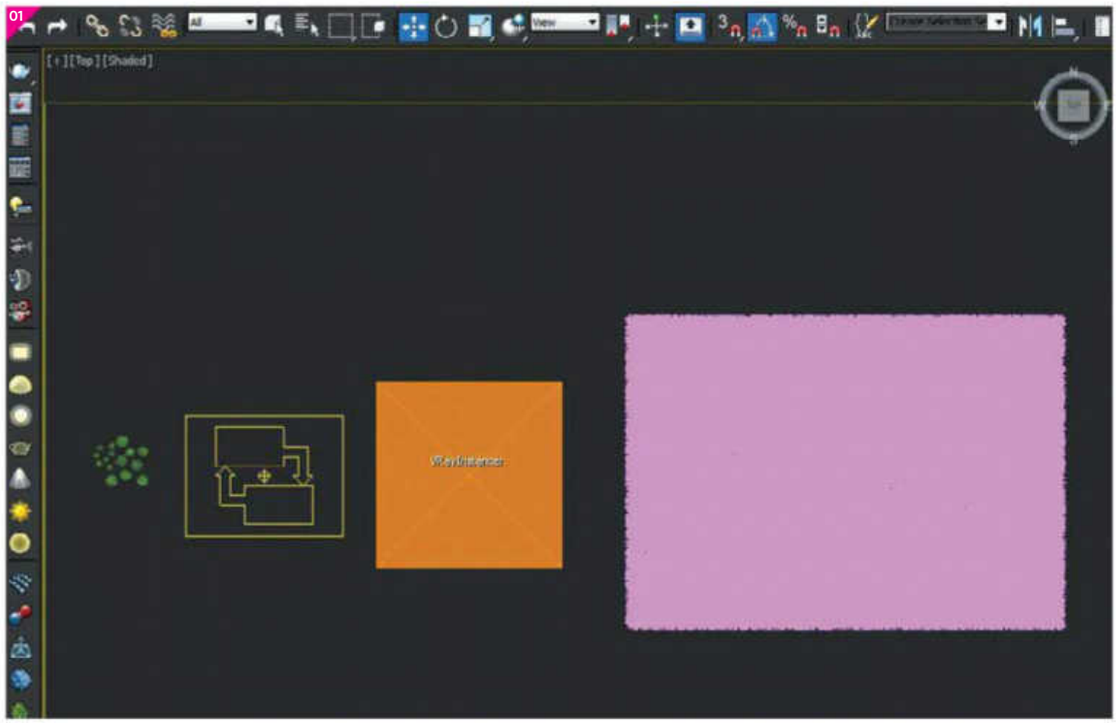
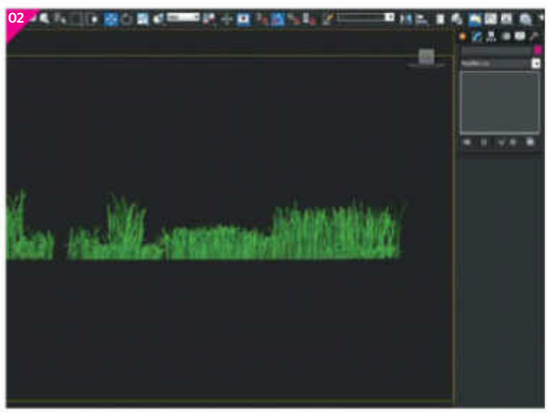
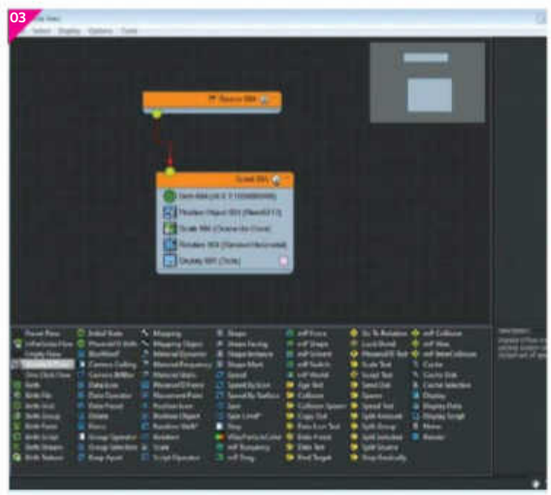
- Tutorial screenshots
- Video tutorial

01 Work with PFlow and VRayInstancer The VRayInstancer was added back in version 3.1 and enables users to instance objects using 3ds Max's PFlow. These are two incredibly powerful tools that open up a whole world of possibilities that are really only limited by your imagination! We will use PFlow to create a load of particles on a surface and then utilise VRayInstancer to scatter our geometry in the locations of the previously created particles.



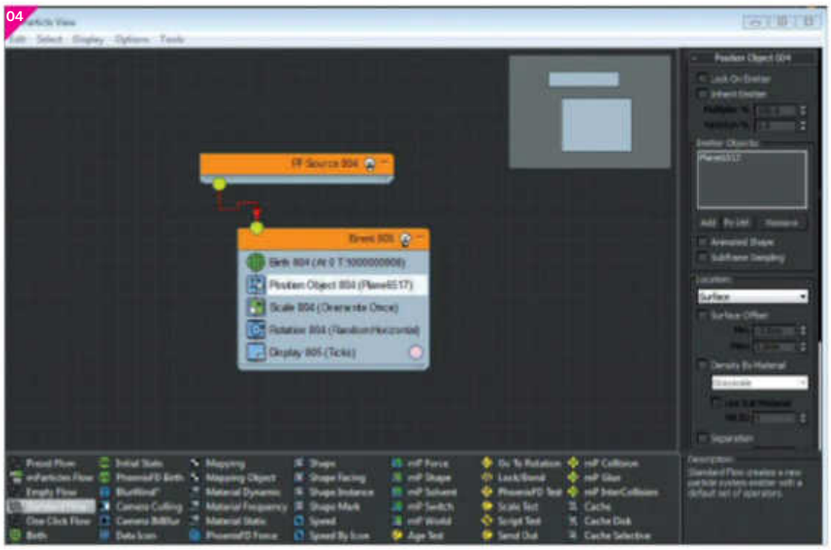


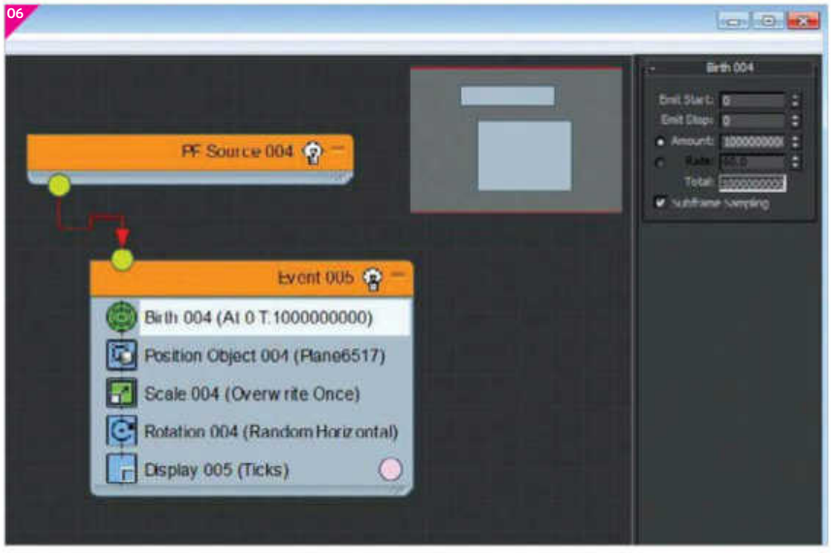
02 Create your geometry to be scattered In this example we're going to create some blades of grass but you could create any object you want. You can even use geometry that you've imported from elsewhere, such as a tree. We've created clumps of grass so that they are easier to scatter. Try to create them in circles so that they overlap more naturally during the scattering process.

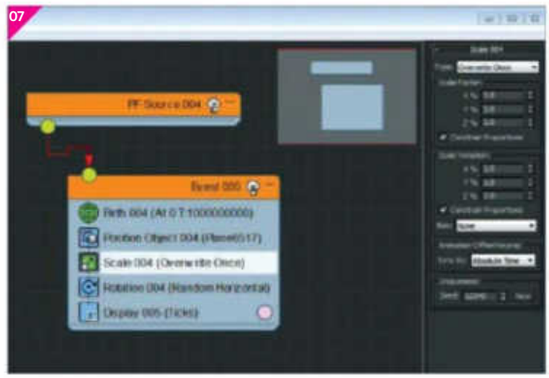


03 Build your particle system Start by pressing 6 on your keyboard and opening PFlow. You'll see an empty node-based editor with a lot of items that can be dragged at the bottom. Drag Standard Flow into the main view and you'll notice that a Source and an Event are created. The Source flows into the Event. Start by deleting both the Shape and Speed items as you don't need these. You can do this by right-clicking on them. Then replace the Position Icon with a Position Object from the menu. Finally, drag a Scale item from the bottom and place it below the Position Object.

Getting to grips with PFlow
Particle Flow is an incredibly powerful tool in 3ds Max. In this tutorial we've not even scratched the surface of what is possible. All we did was create a simple Source birthing particles on a plane. PFlow opens up a world of possibilities for the generation of particles, which can then be linked to VRayInstancer for scattering purposes. There are some excellent step-by-step tutorials on the Autodesk Knowledge Network to help you to understand PFlow better.







04 Change parameters Now we need to set our parameters for the PFlow Event. Click on Birth and set the emit start and stop to 0. This will ensure all the particles are emitted immediately. Then set the amount to your desired number of particles. Secondly, select the Position Object and add your plane to the Emitter Objects list. The plane could, in reality, be any object you like. Set the Scale to a pleasing level for the Variation and the Rotation to RandomHorizontal. Now we're ready to move on.

05 Set up VRayInstancer Now it's time to set up our Instancer. Go to the Create and Geometry menu. Use the dropdown to select V-Ray and VRayInstancer. Now all we need to do is add the Source objects and the particle system. So first, add the Source objects you created back in Step 2; you can add multiple items for added variety. Then add the PFlow Source that you created previously. That's it! Hit render and you'll see your scattered objects.

06 Adjust your particle number If you find that you're not happy with the number of objects that have been scattered on your surface then you will need to head back into PFlow and change the total number of particles that have been birthed at frame 0. This value will top out at 1,000,000,000 and if that is not enough then, unfortunately, you will be required to cut your terrain down into pieces and have multiple instancers.

07 Make more adjustments to your particles The final piece of customisation that you may want to fine-tune is the scaling and the rotation. When scattering objects, it is essential to add natural variation. You can do this in PFlow by fine-tuning the Scale Variation parameters as well as the Rotation parameters. The best thing to do is to have a play until you get a desirable output. Using a GPU renderer or region rendering will be key at this stage.

Exposure colour corrections

Adjusting the exposure of an image is fine in the Frame Buffer, but if you want to do this externally in a program like Photoshop then you need to make sure you are exporting the file in a high dynamic format, such as EXR. This needs to be at least 16-bit depth, but ideally would be 32-bit to give the maximum amount of data to play around with afterwards. If you output your image as an 8-bit JPEG then you're reducing the range of data that you have to play with.

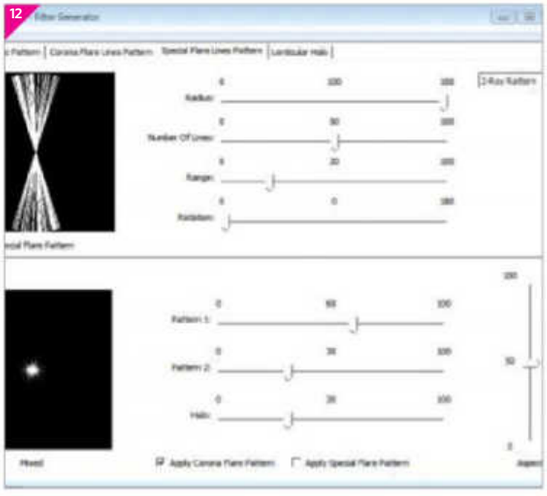
08 Colour correct with V-Ray Frame Buffer The V-Ray Frame Buffer lets you make a whole host of fairly advanced colour corrections on your render, and it does this all in 32-bit depth. This means that you get a wide range of data to be able to make fairly extensive colour corrections, such as changing the exposure and the white balance. We'll take a look at these corrections over the next few steps.

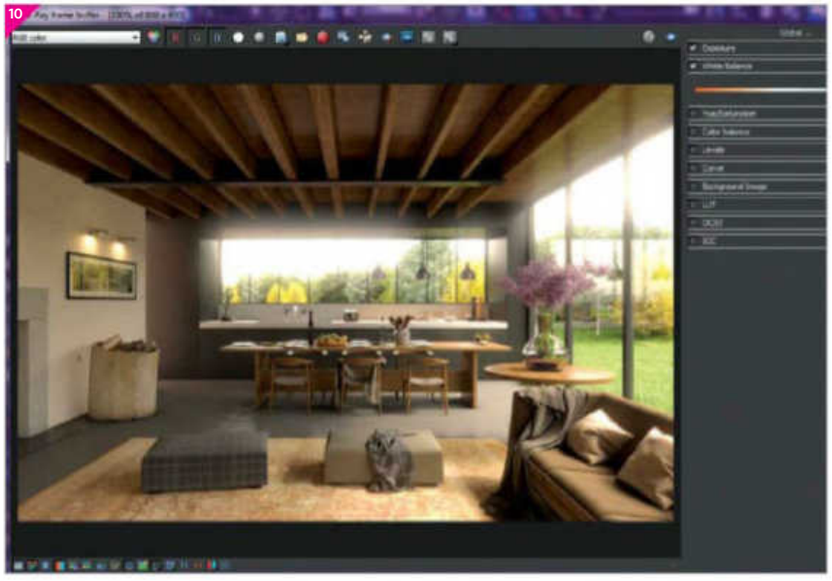
09 Change exposure With the Corrections control bar open you will notice that the first rollout is called Exposure. It contains three very simple sliders: the first adjusts the image brightness of the overall image, the Highlight Burn applies exposure corrections to the highlights only and the Contrast slider pushes the colours either away from or closer to medium grey. Even with blown-out areas in your render you'll be amazed at how much information you can get back by simply adjusting the Exposure value.

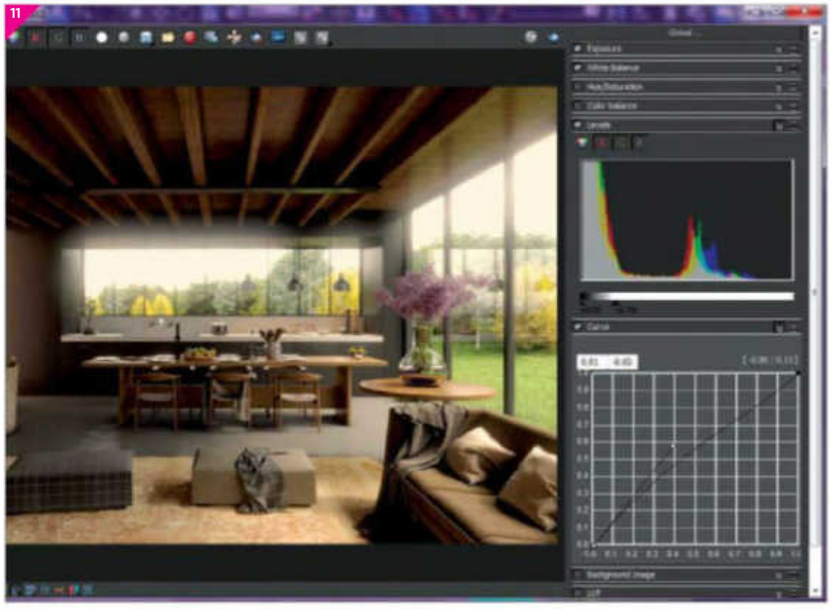
10 Correct white balance Getting the white balance right in any visual is hugely important. It has such an impact upon how the viewer feels about what they're looking at. A blue white balance can leave the viewer feeling cold and distant from what they're looking at, whereas a warmer white balance draws the viewer in and reminds them of happy memories. As we wanted warm grey tones in this visual we'll use a warmer white balance. Note that you can set this inside the camera, but having access to this effect is really useful.

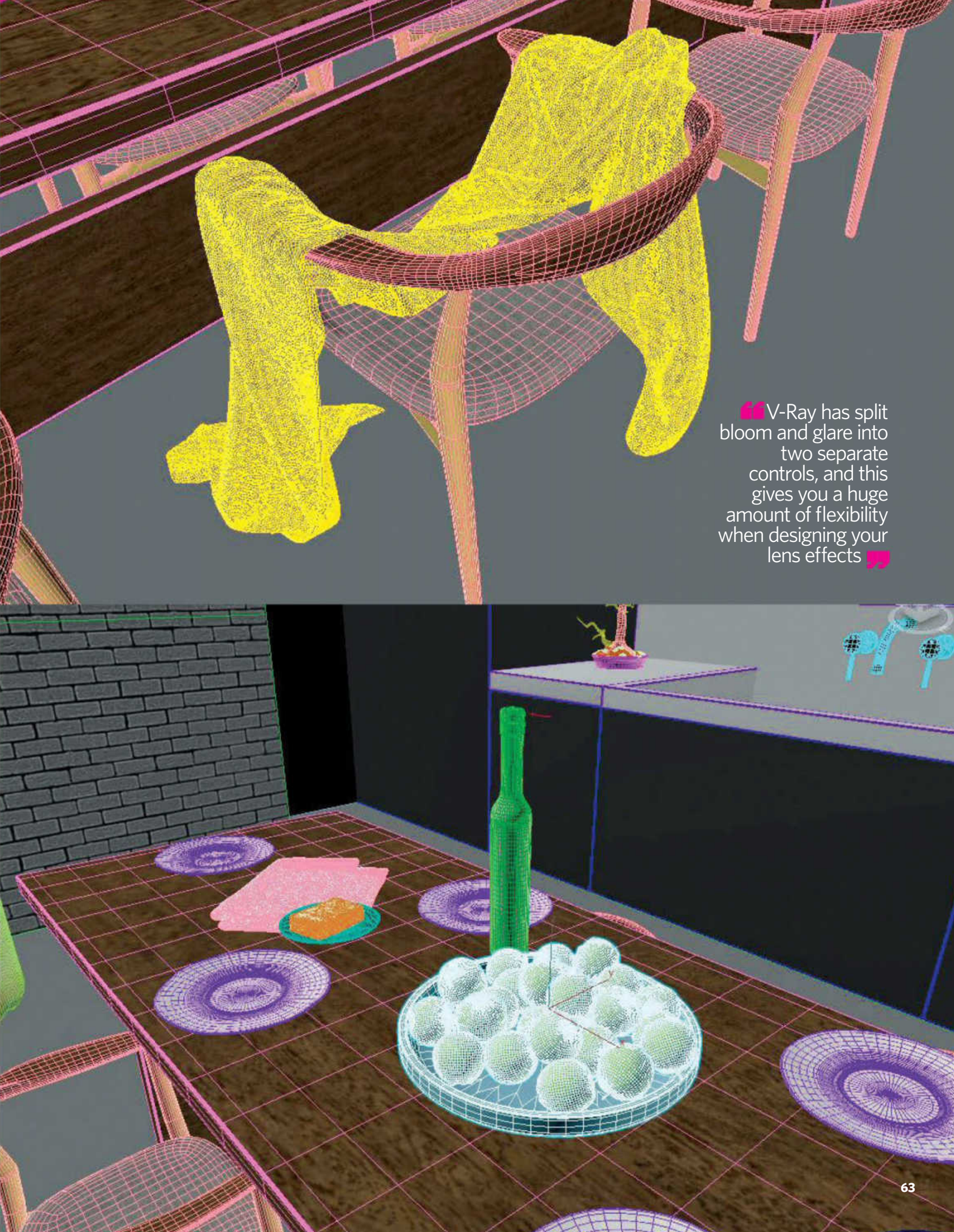
11 Set V-Ray levels and curves The final colour corrections we're going to do are with the levels and curves, although there are plenty other options with the controls as a whole. You can extend the remapping by adding new slider pointers. This can be done using Ctrl+click. The curves tools take the remapping a step further when taking a Bézier curve into account. We're going to add a small Bézier curve to make the image more effective.

12 Add V-Ray Lens Effects This V-Ray feature is an incredibly simple tool that packs a real punch and removes the need to fork out for expensive flare/glare plugins for Photoshop. V-Ray has split bloom and glare into two separate controls, and this gives you a huge amount of flexibility when designing your lens effects. There is even a Filter Generator tool shipped with V-Ray that lets you created customised glare filters.



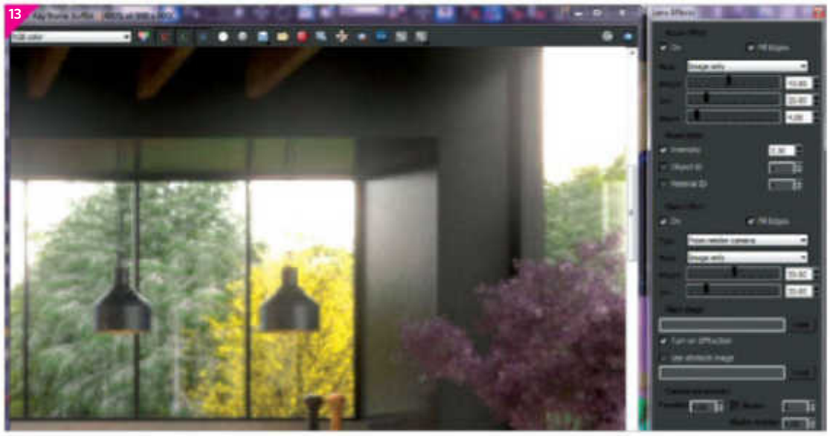




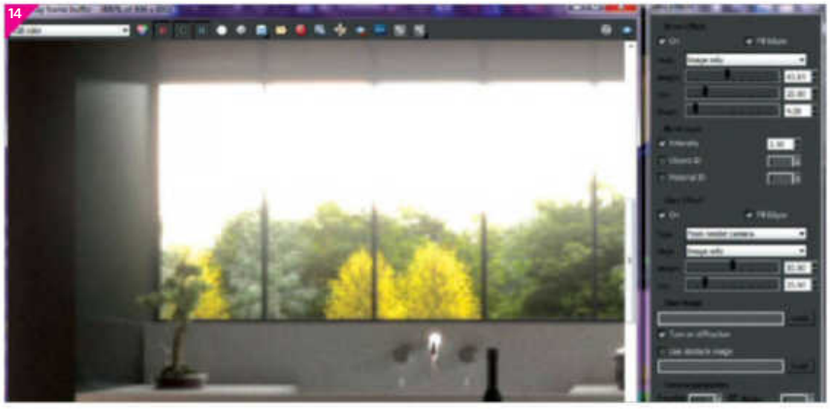


> V-Ray has split bloom and glare into two separate controls, and this gives you a huge amount of flexibility when designing your lens effects

13 Add V-Ray bloom Bloom is an effect that produces fringes of light bleeding out of the edges of bright parts of an image. Playing with the weight, size and shape will give you the exact effect you want. One other helpful thing is the Bloom mask's Intensity setting, which ensures that the bloom effect is only applied to really bright areas of the image.



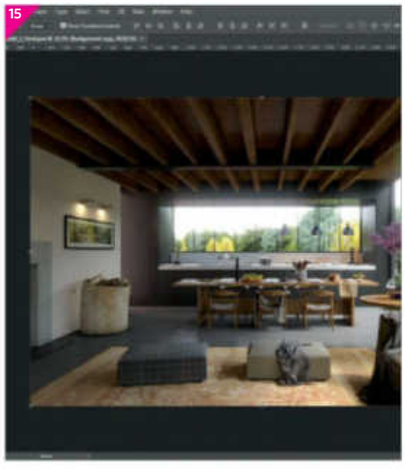
14 Set V-Ray glare Glare is when excessive amounts of light are reflected into your camera. This is dependent on the angle of the Sun and the existence of reflective items in your scene. V-Ray lets you apply glare based on the camera parameters so that the f-stop number and lens blades play a vital role in the glare creation. It's important to tick 'Turn on diffraction' as it splits your glare into different colour channels and gives you an especially realistic effect.



15 Work on final touches Obviously if you want to further fine-tune your visual or make adjustments to it using render elements that you have created then you'll need to take it to another program such as Photoshop. We always attempt to get the look right in render, but sometimes it needs to be adjusted beyond the capabilities of V-Ray's colour-correction tools.

Feature-specific plugins

We've only used 3ds Max and V-Ray for this tutorial but there are some great plugins that will make your life easier. For scattering there is Forest Pack or VRayScatter. For other parametric modelling requirements there is RailClone. For post-production you have a massive range of options including Photoshop and After Effects, and plugins such as Magic Bullet Looks. The more money you're willing to pay, the more tools you'll have at your disposal.



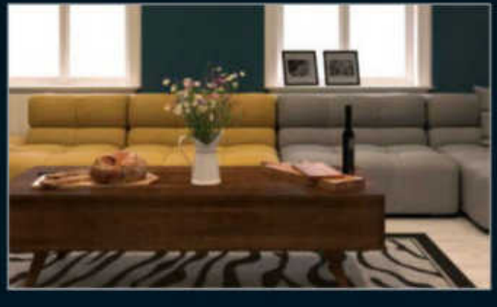
Showcase

Paul Hatton

Paul has been working in the 3D visualisation industry for over a decade and has fulfilled various roles during this time. He started off as a 3D artist in a small team and has progressed to leading a team at a different studio. He loves getting to grips with new technologies that make his life as an artist easier.

Knick-Knacks,
3ds Max, V-Ray (2015)
This is a collection of fairly pointless knick-knacks arranged on a side table and shelf. Paul wanted to create something simple with a complementary colour palette.

Waiting for you,
3ds Max, V-Ray (2015)
This image begs the viewer to come in and sit down. The egg chair just looks so comfortable! With the daylight streaming in through the window it is a beautifully light room.



Straight lines,
3ds Max, V-Ray (2014)
Paul was keen to create an image with a lot of straight lines, sending the viewer all over the image as they let their eye follow around.

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3ds Max

Matthias Develtere
develteremattthias.wordpress.com

Matthias is a junior 3D artist at MachineGames. He loves making vehicles for his sci-fi universe

Houdini

Rainer Duda
rainer-d.de

Rainer is a Houdini TD specialising in environments, simulations and volumetric effects

Maya

Jahirul Amin
jahirulamin.com

Jahirul is a 3D trainer at Double Negative. He has a passion for observing and dissecting the real world

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3DS MAX

Develop sci-fi concepts from reference

Working in the videogames industry is really awesome, especially when you get some kick-ass concept art to base your work on. But at the same time, it's double the amount of fun if you can design it yourself and then model it. It's just something to be proud of if you can say "Yes I designed this myself". This is the third part of a sci-fi vehicle series by Matthias Develtere. The others can be found by going to develteremattthias.wordpress.com/category/sci-fi-ww2-vehicles.

In this tutorial we will go over steps for coming up with your own unique design for a vehicle. Throughout this guide we won't discuss modelling or post-production. You don't necessarily need any software packages either – it's all about coming up with an idea. Note that this is not the 'Perfect checklist for making a kick-ass concept'. These are useful tips that you should keep in the back of your mind while designing. We will focus on how to come up with a design that your audience can relate to. Another main focus point for this tutorial will be to make sure you don't alienate your audience with an over-the-top design – we will try to come up with something that feels fresh and new but at the same time it will still resemble something. Like we said before, this is not a modelling tutorial but it comes with the need to do some machinery modelling. The video included with FileSilo features an extra two-hour video of designing hard-surface shapes on the spot – this could be useful if you want to learn how to make quick kitbash pieces for adding to your model later. Note that these models were made with 3ds Max.

01 Lay out your ideas Always start with research. The best way is to collect interesting pictures every day and categorise them so you can find them easily later. Again it's really important to have a lot of references for mechanical pieces – even if you are going to make a sci-fi vehicle, it's important that it looks like it could work. We've gone to museums for inspiration for our vehicle, but next to searching for a lot of normal mechanical pieces it's important to find at least one unique shape for our design to blend into your model.

02 Blend old with new The idea of making a sci-fi version is to make a fresh new version of an existing design, so it makes sense that you blend in new fresh ideas with

> When designing your vehicle, try to combine hard surface with organic elements in a 70/30 ratio

shapes from the 'old': a real existing model. Let's take the tank as an example. This was a Swedish prototype tank, and its wheels were copied into our GM8 Greyhound tank. This was the same for the new wheels that are protected underneath the hull. A good way of blending these into each other is by searching for an empty/hollow spot in the Greyhound and stitching the new wheels there. Notice how we tried to keep the same amount of wheels from the Greyhound design, again it's all about finding a compromise when blending designs.

03 Come up with a style The style we used for these is an industrial look (using a lot of bolts), combined with technical shapes and smooth shapes. For example, take a closer look at the Maschinen Krieger style; it's a good example of how smooth shapes can be used. If you want to make a series of vehicles, it's important that all of these vehicles share the same style. Also, when designing your vehicle, try to combine hard surface with organic elements in a 70/30 ratio – that way your design will feel less boring.

04 Mark the characteristics Basing your work on an existing design or piece of art is easier said then done. The first thing you should do is go over an existing design and check what makes it look recognisable, so let's go over the Greyhound: it has a long shape, double wheels at the back, two hatches at the front and a tank turret in the middle. This sounds like a lot of shapes to get into your checklist but remember that the word hatch can mean many things – as long as the end function is the same you should be fine. Another thing you should check is how shapes behave in the existing design. You can have 45 or 90-degree corners, smooth or round shapes. Noticing these things from the start is really important because they will affect the light bouncing on your model.

05 Check silhouettes When you come up with your own project it's really important that you make sure the silhouette is same. A quick way to check this is by taking a side view and making it black and white, and then comparing it with the side view of your model. It's also important to keep the same amount of detail/spacing. Just remember that having some empty spaces can be a good thing, as less can be more. Always keep in mind that your audience should be able to instantly relate to your design. Check the image for this step to see both a good and a bad example.

06 Explain ideas with colour schemes When you lay out your model, it can be hard to present it to other people. Using colours can help you a lot when it comes to getting a nice overall feeling of your model. It can even help you design stuff. Sometimes we will notice that a specific area of our sci-fi model is too empty – a good way of fixing that is by trying to come up with some interesting materials to break up boring car paint. For example, add explosive props on your vehicle and paint them red. This is the same when you are adding some text or logos on your design, these things are small but they can bring so much more to your design – especially if you pick a different colour for them.

01

Get rid of tunnel vision

A problem that can occur with your design is that you can end up having tunnel vision. To prevent that, it's a good idea to render at the end or the beginning of your model session and do some paintovers of it – just marking what is wrong or stuff that you aren't 100 per cent convinced with. This could help a lot for your next model session – you'll start tackling old problems before adding more stuff. You can make it even easier for yourself and ask for daily feedback from friends or colleagues.

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HOUDINI

Master ragdoll physics with the RBD solver in Houdini 15

Crowd simulations are by far one of the most interesting areas in modern computer graphics for movies and TV shows. Houdini 15 from Side Effects Software has probably the best toolset to create and control large crowds in terms of movement and interaction with the digital world. In this tutorial we will make use of a bunch of shelf tools to save time. At first, though, there must be a character. Usually the Houdini crowd simulation network takes all character HDAs as input, which includes a character mesh, rigging information and animations such as walk cycles – regardless of hand-animated or mocap data. The first network will render out so-called agent information files from a character to the hard disc; bake agent is the function that will do the job for us to save time. The agent will create the ROP output network automatically and this process of baking data out is really important in terms of speed improvements during the simulation work. Before we move on with the other networks, we will prepare the character/agent with collision geometries and joint limitations as we know it from game development, because we want to use our agents in a crowd simulation with ragdoll physics.

Therefore we must create a special kind of geometry network, which loads the agent data from the hard disc to create the crowd source. This so-called crowd source network creates a crowd of agent primitives, which are described by the data loaded from the hard disc. In this process we can define an area of interest where the zombies will be scattered. If we don't assign a special geometry, Houdini will create a special area that can be controlled via the parameter pane.

To save time we use the Populate function in the crowd shelf to create the crowd source network and scatter it. Additionally we will be able to simulate our crowd by pressing the Simulate function in the crowd shelf – this will create our last network for the crowd simulation dynamics. There, we will prepare some RBD objects, static RBD objects and crowd obstacles to work and interact with the crowd. After this tutorial you will be able to set up crowds and ragdoll physics, and modify them according to your own needs.

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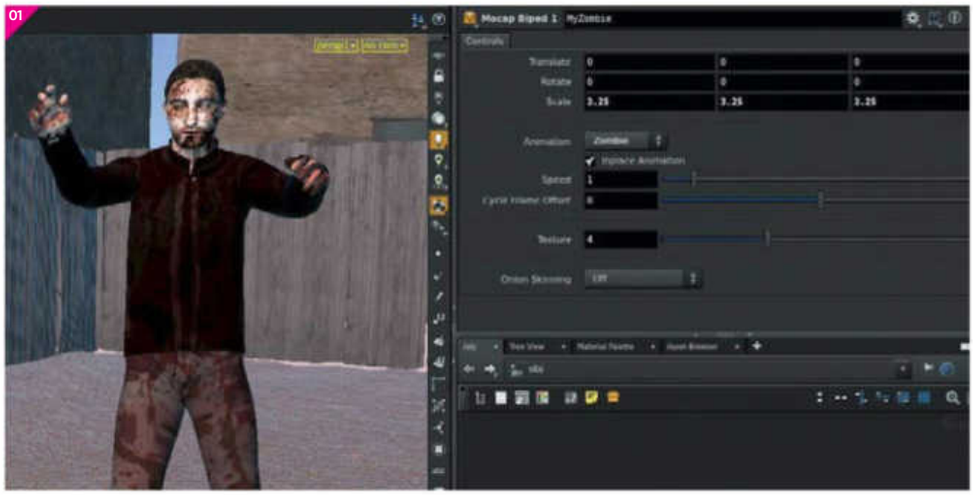
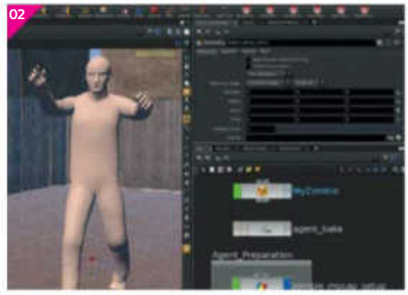
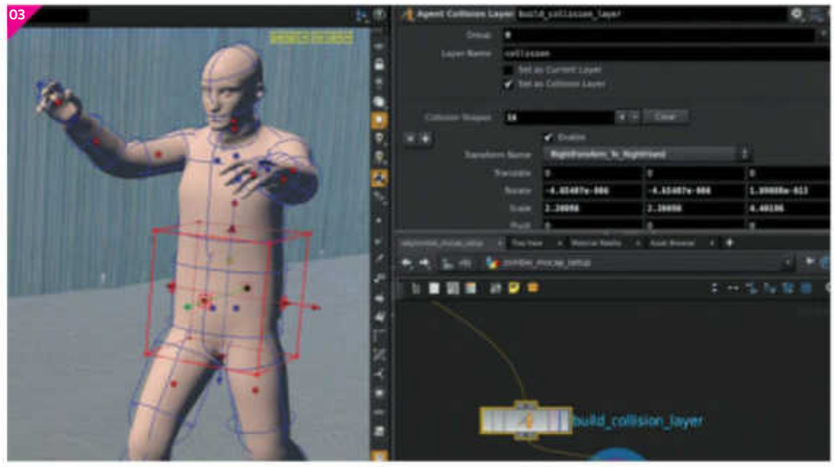
from **filesilo.co.uk/3dartist**
- Tutorial screenshots
- Houdini scene files
- Video tutorial



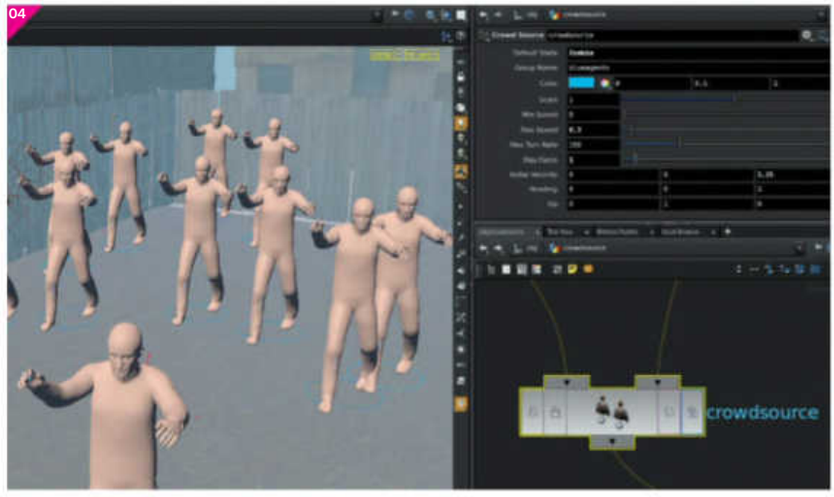
01 Characters for the crowd system Before we start working with the actual crowd system we have to set up a character including rig and animation cycles. To make things easy, we use one of SESI's Mocap Biped character presets from the character shelf. We simply press the Mocap Biped 1 symbol to create a character in our scene. Afterwards we rename the node in the network editor pane to 'Zombie_Male'. With a selected node jump into the attribute editor, change the Animation setting to Zombie and decrease the Speed to 0.5. Texture lets you assign a texture to the preset character – let's choose option 4 for a zombie look.



02 Bake out your character information Houdini's crowd system is not directly working with your character information and, furthermore, you need to create a character agent out of your character and cache the simulation data to disc. The crowd system will fetch the baked data to simulate the crowd later. Again, to make things easy, we simply select the Character node in the network editor pane and hit Bake Agent in the crowds shelf. Houdini will create an agent and a baking network automatically. It's worth mentioning that the crowd system usually thinks your character is a digital asset, so you can prepare your own characters as an HDA.



03 Prepare the agent for action To create realistic behaviour, our agents requires good collision information and limits for the joint rotations. First, add an agent collision layer to create a simple collision shape for each joint. To do that, just go to the crowds shelf and press Collision Layer. By default, Houdini will create good shapes but we need to adjust their appearance by selecting the respective bone marker and using the Transform tools. To limit the rotations hit Configure Joints next to the Collision Layer function. If you left-click on a joint marker, you can set up the limits.



04 Populate your area of interest Now, as the agent is ready for action we can start populating. Select the populate function in the Crowds tab. Now pick the agent (the zombie) and press Enter. Next, select the premade ground floor geo node and hit Enter again. Houdini will then create a crowd source network, which takes input agents and populates them over the plugged ground geo, or Houdini will create a Crowd Source object including a constraint network. On the Crowd Source node decrease the Max Speed to 0.3 and Max Force to a value of 5. Set the Max Turn Rate at 90 degrees.

Build complex trigger logic

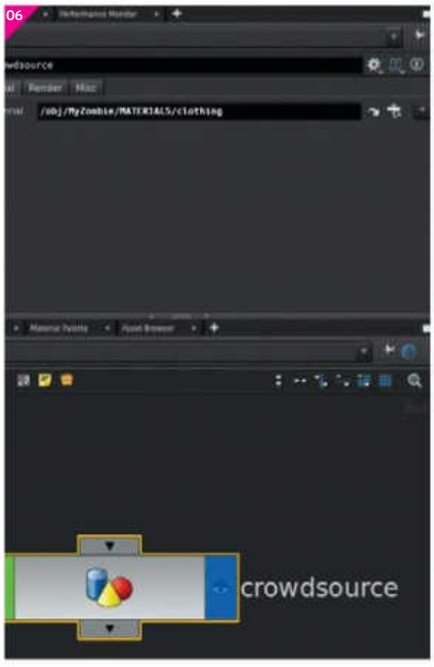
In our tutorial we made just one crowd trigger, which triggers the crowd by RBD impact data defined by DOP impact objects. What that means is that a special event is happening and the state of the crowd will change immediately, but there is way more you can do. You can create a quite complex crowd trigger system with the use of a Crowd Trigger Logic node. This node lets you combine two different crowd triggers or different Crowd Trigger Logic nodes so that you can create a huge logic tree for your crowd with various crowd trigger types.

05 Bring the agents to life To make all the agents move we must create a crowd simulation network with its core as the crowd solver. A setup like this consumes probably the most time. Therefore we use one of Houdini's great shelf tools called Simulate in the Crowd tab. Let's select the Crowd Source node and hit Simulate to automatically create a Crowd Simulation network. To make the zombies walk like zombies, we have to dive into the Crowd Sim node to the Crowd States. We must rename the Walk node to 'zombie'. If the simulation is played, then they will walk with the zombie walk cycle.

06 Finish agents and RBD preparation The agents are now set and ready for simulation. What's left to do is the material assignment. To apply a material the fastest way you possibly can, just select the Crowd Source node and in the parameter pane you can now press the tab material. Now search for the clothing material in the materials section within the character HDA as this will give us the same look on every zombie. For the RBD preparation we first need a ground plane object. To create a ground plane just switch to the rigid bodies shelf and press ground plane.

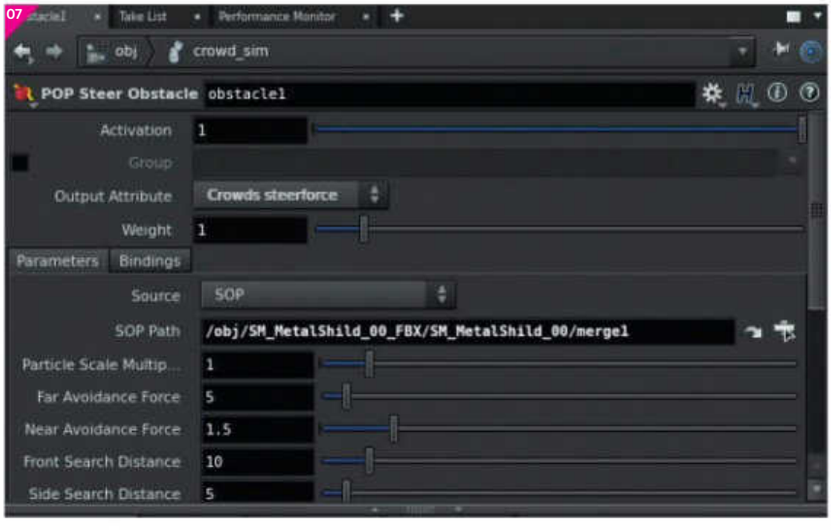
07 Watch where they walk The idea for this scene is that a burning barrel flies right into the zombie crowd to stop them, but before we jump right into the RBD action it is time to prepare the geometry around the crowd. At first we must tell the crowd what is an obstacle and what is not. Let's dive into the Crowd Sim node. We need to add a POP Steer Obstacle node between the Crowd Solver and the states. On this Obstacle node, it is necessary to define the obstacle with a source SOP. Under SOP Path simply select the geometry, which should be an obstacle.

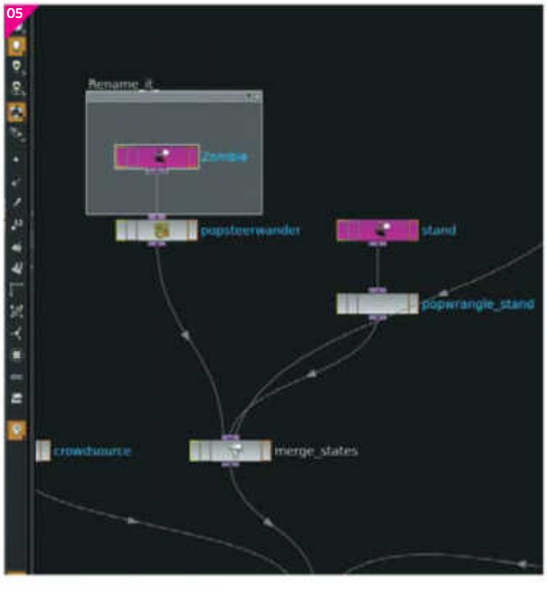
08 Adjustments for the crowd Right now we have the crowd spread around our small walking area so let's make some adjustments to it. We go back into the Crowd Source node and add a Transform node between the ground floor and the Crowd Source Object node. Let's scale the area down to a factor of 0.8 at the Uniform Scale. At the Crowd Source Object we choose a formation with 12 rows, six columns and a spacing of three for the layout – this will give us a nice little battalion of zombies.

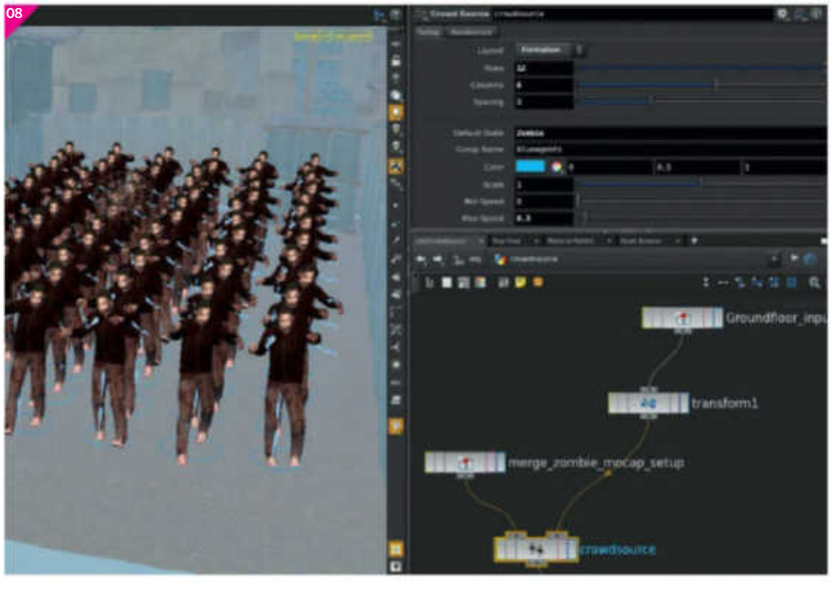


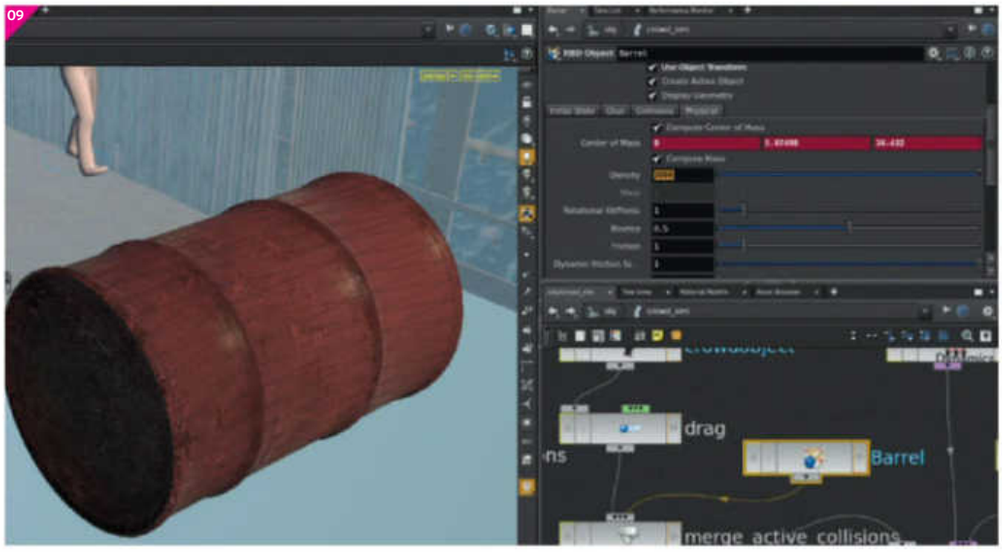
Let the crowd follow a path

Let's imagine you watch *The Walking Dead* and you see zombies walking down a highway. To achieve this behaviour just add a curve/spline object along a special route in your scene and hit the Path function in the crowds shelf. It will create a POP Steer patch node. Reduce the Anticipation to zero and increase the Force Scale so that the agents will follow the curve correctly, but make sure that you adjust the In Place Gate Speed on the Crowd State node for realistic movement, and on the Crowd Solver you can change the agent separation with Weight and Force Scale.









Randomising the agents within the crowd

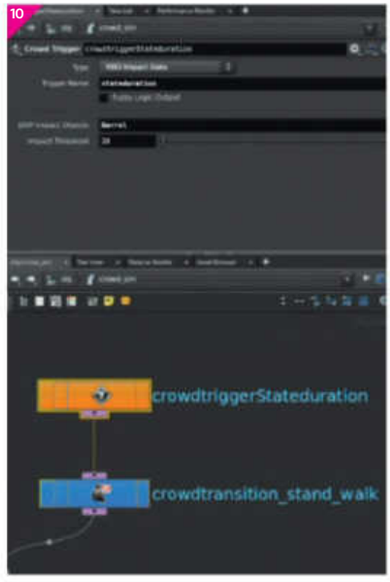
If you have a crowd simulation where the agents are not visible via a close-up shot, then you don't really need vex coding for changing the agent's appearance and special behaviours. Simply go to the Crowd Source Object node and dive into it. In there is the actual Crowd Source node containing a Randomize tab in the parameter pane. There you will find various parameters to play with like the Agent Scale and maximum and minimal speeds. Randomising these speeds is a quick trick for adding randomness to a crowd.

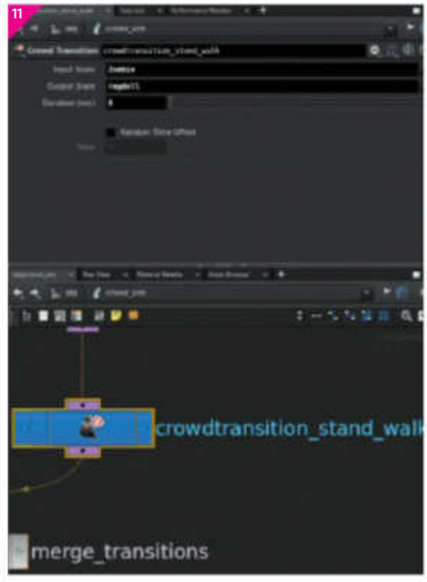
09 Convert barrel into an RBD object Now we finally make the barrel move. To do that we select the corresponding barrel geo node in the network editor pane on OBJ level and jump again to the Rigid Bodies shelf tab. Convert the barrel into moving objects by pressing the RBD Object function, which creates RBD Objects from SOPs. Back in the Crowd Sim network we must increase the Density (weight) of the barrel on the RBD Barrel node in the Physical tab. In addition let's play a bit with the Velocity under Initial State by adding a value of -30 in the Velocity Z field.

10 Adjust the Crowd Trigger node The Crowd Trigger node within the Crowd Sim network is our next target. This is actually a really powerful node because you can add a special kind of logic to the agents and trigger different states like in videogame AI. We just let the zombies die if they get hit by a heavy barrel. To do that we must change the type to RBD impact data and add the name of the RBD barrel object into the DOP impact objects line. Furthermore we need to take a look at the Crowd State node and change the RBD ragdoll to Animated Static mode.

11 Set up the crowd transition states As we now know how to add logic to our crowd it is time to define the different states we need. Our Input State will be called 'Zombie' (be careful – it is case sensitive). The Output State will be Ragdoll in this case. It's really important to get a correct look and feel by setting the Duration to 0 and deactivating the random time offset, otherwise the zombies will continue to walk after getting hit with a heavy RBD Object. You can play around with these features if you hit the zombies – for example by using projectiles to slow down their walking.

12 Play the simulation Last but not least, you are now ready to play your simulation and/or render it out. To play the simulation, just press the play button next to the timeline below the 3D viewport. The first run will cache the data to disc and only resimulate it if necessary. The already cached and simulated data is visible through blue indicators within the timeline. To render it out use the already prepared Render Output node inside the ROP network or switch to the render view to render out a still by selecting the corresponding camera and Mantra Output node.





MAYA

Animate a parkour sequence – part 2

Welcome to part two of our parkour animation tutorial in Maya. Continuing on from where we left off in issue 91, in this tutorial, rather than working through all the shots one by one which could become very repetitive, we'll be focusing on just one shot. However, through this focus we'll be sharing a workflow with you that you can use as a sort of template for every proceeding shot. The shot we've decided to focus on is the fifth, where our character performs the dash vault.

We'll start by taking a look at our existing poses to see if we are 100 per cent happy with them. After that, we'll add some additional poses (the in-betweens) so that things flow more predictably when we transition our animation curves from Stepped tangents to Spline tangents.

At that stage, the clean-up process really begins. We'll refine the movement from the core of the character (the hips and spine) and work our way downwards to the legs. Moving from the core outwards ensures that any changes we make to the limbs don't come back to haunt us, and should hopefully reduce the number of iterations we have to go through to achieve the final result.

With the core movement in a stronger position, we'll move on to tidying up the movement in the neck and the arms, and finally we'll come to the fingers and adding secondary motion.

As we progress through the clean-up phase, we'll also want to make sure that we track key points in the body to ensure that the animation is fluid, with natural arcs being created through the movement. At the same time, we'll want to maintain a sense of weight in our animation. Balancing all of the above elements will help us to create a successful and appealing animation.

01 Always refer back to the reference At this stage and with the main poses in place, it's very easy to just focus on polishing the animation and putting the reference to one side. We highly recommend you don't go down that route and keep the reference as close to your peripheral vision as possible. In our case, we've made sure to keep the animation reference on an image plane in the Maya viewport. That way we can still analyse the footage frame by frame. You'll be surprised by how many extra bits of information you'll extract by keeping the reference in sight as much as possible.

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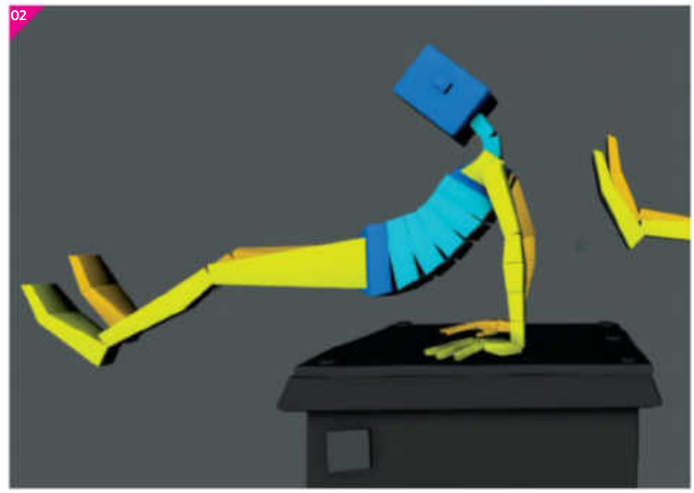
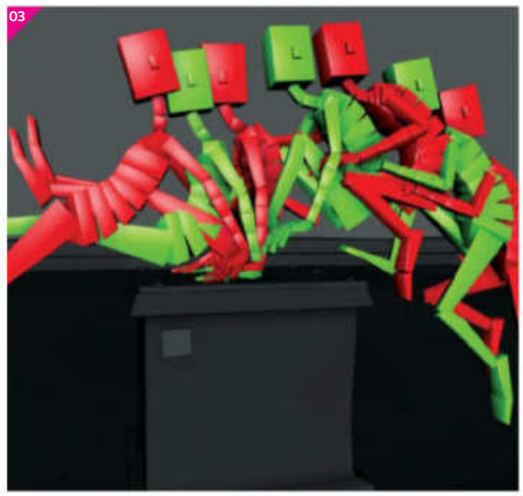


02 Revisit and refine existing poses If you have the time, leave your animation for a few days and come back to it with fresh eyes – if you have deadlines looming, this will not be practical, but even a few hours will suffice. Taking the time away from your work and then coming back to it will allow you to re-examine your work more clearly and generally see the wood for the trees. For this dash vault shot, coming back to the work a week or so after the blocking stage, we found that we were not happy with some of the timing and some of the poses from where we'd left off. A quick review of the reference made it clear where we needed to make things stronger, which then informed the changes required to make the existing poses.

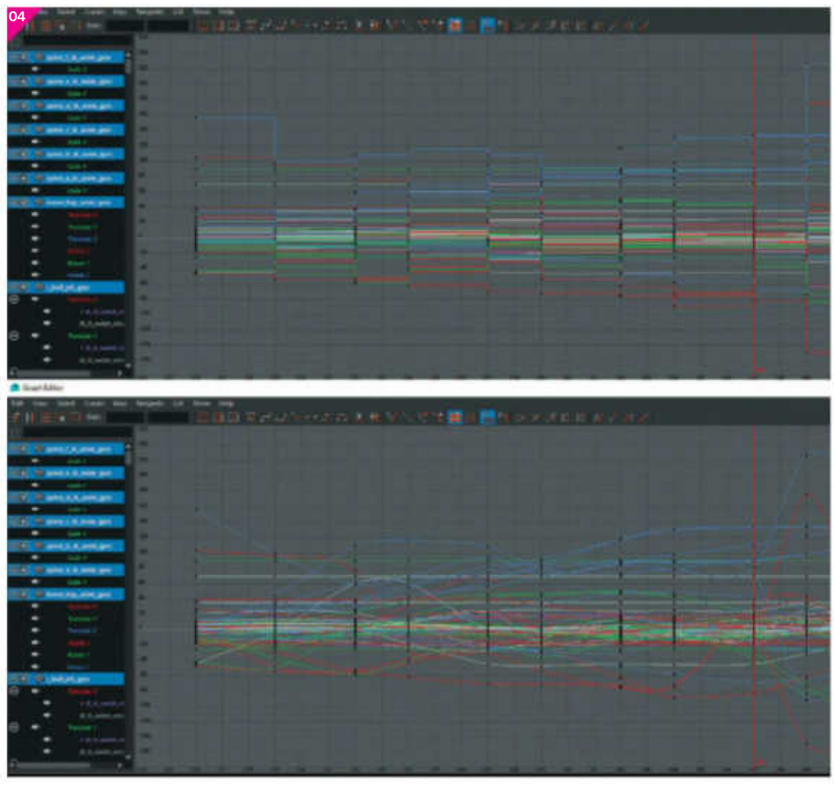
03 Add the in-between poses With the poses now nailed down, we had keys on every six to eight frames or so (sometimes every four frames). At this stage, we decided to add a further set of poses between each of the current poses (well, most of them anyhow) – this was useful for two reasons. Firstly, animating in IK mode for the legs and the arms results in a very linear motion from one pose to the next, which can create very unnatural looking motion. By adding an in-between pose, we can easily control how the movement of the arms and the legs should transition from one pose to the next (in arc-like motions for most cases). Secondly, by adding in-between poses we're more in control of how our character should move than if we were to let Maya do the interpolation for us.

04 From stepped to spline With the in-between poses in place, convert the animation curves from Stepped mode to Spline. To do this, select all the controls in the Viewport, jump into the Graph Editor, select all the animation curves, and then go to Tangents>Spline. You can also experiment with setting the tangents to Auto initially. This sometimes works better with reducing the undershoots and overshoots that can occur in the animation curves when you have the same values on two keyframes that are pretty close together. Another thing you should do is jump into the Animation Preferences and make sure you set the Default In and Out Tangents to either Spline or Auto. This will ensure that any keyframes added will have the correct tangents with the existing curves. At this stage, you can simply go into the Graph Editor and edit the curves one by one. The first thing to look for would be any animation curves that are straight. This indicates that there is no movement being created from that attribute and therefore you can delete that animation curve.



bhGhost Tool

The native ghosting tool in Maya 2016 seems to work a lot better than previous incarnations. However, if you want a tool with a bit more oomph, we suggest you check out the bhGhost tool from Brian Horgan: **graphite9.com/MayaDownloads.html**. We've been using this for quite some time now and it's a little gem when it comes to ghosting in Maya.



05 Clean up the hip movement Now we come to cleaning up the animation, and we'll kick things off with the hip region. You'll find that as we transitioned from Stepped tangents to Spline, some of the weight in the animation has disappeared and things have become a little floaty. If you could only pick one control/region of the body to work on and thereby help create a sense of weight, we would say make it the hip, which is essentially the core from which most of our movement originates. We like to think of the hip as one large bouncing ball and treat it in the same way. You could, essentially, animate a bouncing ball performing the dash vault, copy the animation onto the root/hip control and things should look pretty good. Although we're not animating a bouncing ball, we do have that motion of the hips acting as the ball in the back of our mind. As we clean up the hips, we will also take advantage of Motion Trails to ensure that we get a clean and natural-looking flow (more details on this in Step 9).

06 Work on the spine movement The spine comes next. With the spine, we're mainly focusing on getting clean shapes and strong contrast from one C-shape to a reverse C-shape. We're also trying to get some strong S-curves flowing through the motion, especially at the latter stages of the move as the character comes to land. As you work on the spine, remember to counter the movement of the shoulders with the hips. This should help maintain a feeling of balance and believability. Additionally, for the spine, you'll notice we have three FK controls and two IK controls (for the hips and the shoulders). As you animate the spine, try not to overcomplicate how many controls you use as this can make the clean-up process a little long-winded. If you can get a clean and appealing pose with just the IK controls, then use them. If you need to use the FK controls on top to strengthen the pose, then do so.

07 Work on the legs Let's move on to the legs now. The main aims here are to capture the strong arcs created as the character vaults over the block and lands. We also need to ensure that as the feet make contact with the ground, the foot stays locked in place and does not slide around. This is not as important towards the latter stage of the shot as the character's feet are off camera at this point, but it will be crucial at the beginning of the shot. As we go into the jump, we'll also want to have the feet move with a fluid motion rather than linearly; Maya will try to keep things linear due to the nature of the controls being in IK mode. To combat this, you are more than likely to find that you'll need to add additional keyframes to create the desired motion. Adding more keyframes, however, can start to add a staccato feel to the animation, so make sure you constantly review your work via Playblasts.

08 Refine the arms, neck and head The arms are the next port of call. The arms are in IK mode, so we'll come across similar issues regarding trying to maintain arcs in the movement. More importantly, however, will be trying to keep the hands planted down nicely on the block, and then to capture the motion of rolling onto the palm of the hands and then exiting from the tip of the fingers. Before we look into the fingers though, try and get the shoulders, the elbows and the hands in a good place. At this stage, some of the fingers are still going through the block, but we can clean that up in the next step. The main focus here is to get the arms to feel like they are taking the weight of the body and then able to push off. When you are happy with the arms, you can easily clean up the

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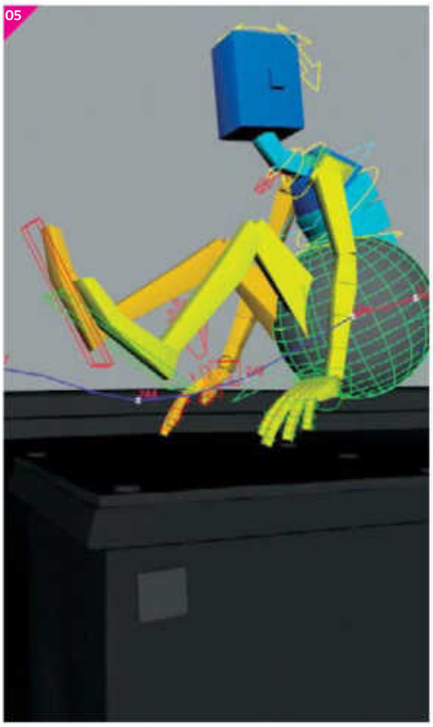

Playblast with Motion Blur and Lights

Once you have converted your animation curves from Stepped tangents to Spline, create all further Playblasts with Motion Blur enabled. This should help sell the movement and give you a better indication of what the final motion will look like in the renders. You can enable this by going to the Renderer menu on the Viewport and going into the options for Viewport 2.0. From there, you can navigate to Motion Blur and check the Enable flag.

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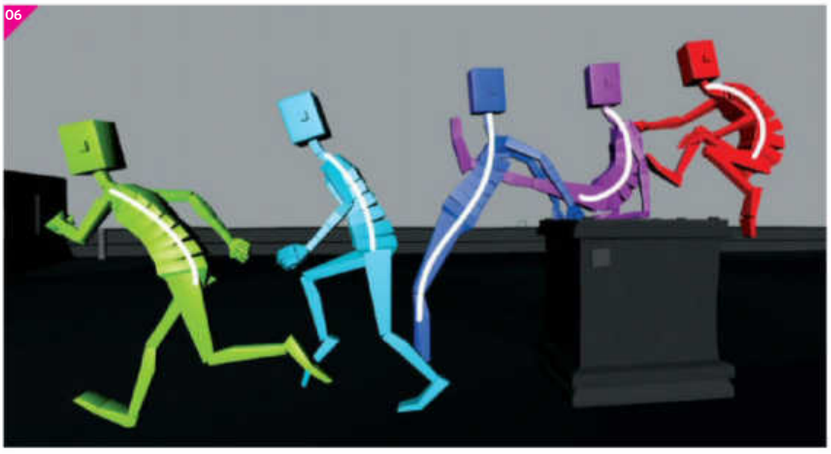

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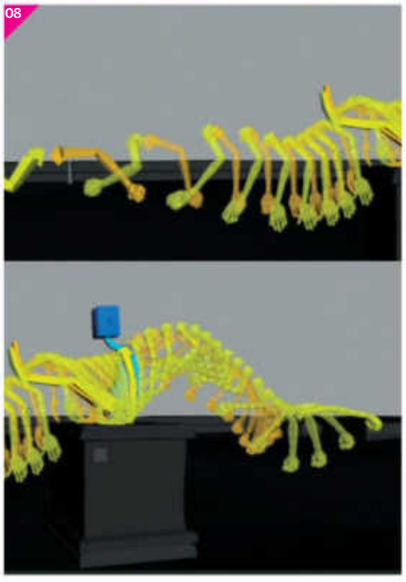


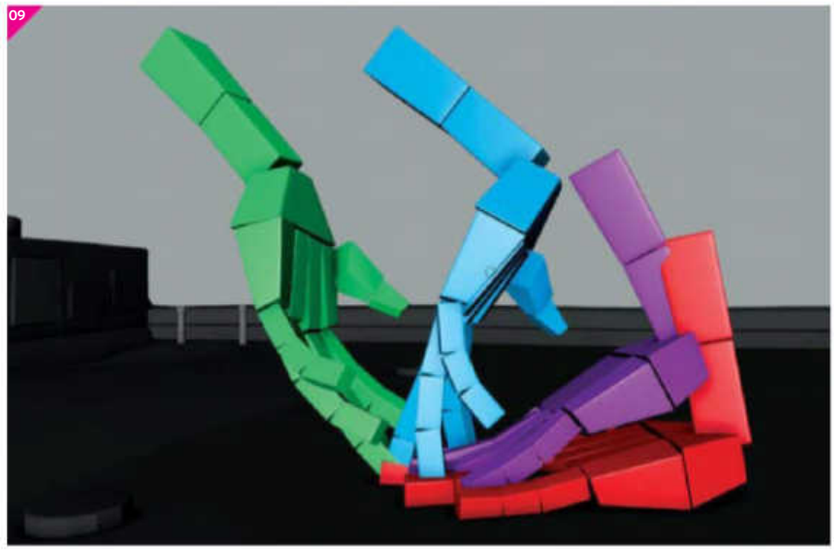
movement of the neck and head. Try to mainly use the arms to create a sense of drag and overlap, whilst still supporting the gesture of the spine.

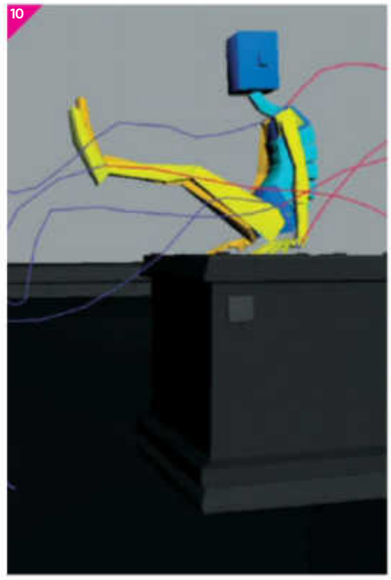
09 Focus on the fingers With some rigs, you'll find controls may be available to allow you to pivot from the tip of the fingers (which is exactly what we need to do). This rig, however, does not have that functionality. To help solve this, create some polygon planes, position them at the point at which the hand needs to pivot from (the tip of the fingers), and then add them to a Display Layer and set the mode to Template. From this, we can visually make sure the fingers and hands do not slide around as he vaults over the block. With the bulk of the fingers cleaned up we did a second pass, animating each finger and then each digit individually. This was to help strengthen the illusion that the character is making contact with the block and having pressure applied to his extremities.

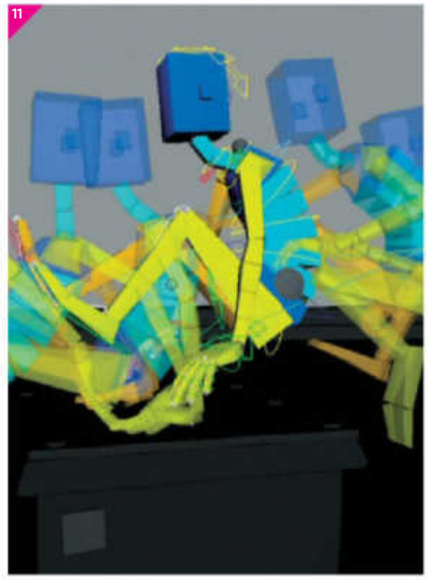
10 Use Motion Trails As you work on all of the above, make sure that you are creating nice, natural-looking arcs and achieving fluidity in the animation. To help visualise the movement, you can use Motion Trails in Maya. To do this, simply select a control and in the Animation menu, go to Visualize>Create Editable Motion Trail. This will create a Motion Trail from the pivot of the selected control. This works fine for things like the main body control. However, for things like the feet, the elbows and knees and so on, we won't want to create a trail from the control (as the pivot point is not ideal). In these circumstances, we tend to do something like this: create a sphere and scale it so that it is very small. Then, position the sphere to a point on the model from which you'd like to generate a motion trail, eg the ankle. We tend to use Snap to Points for this. After that, parent the sphere to the closest joint on the rig (you'll need to unreference the joints in the Display Layers to do so). Now set a key on the sphere. Lastly, with the sphere selected, go to Visualize>Create Editable Motion Trail.

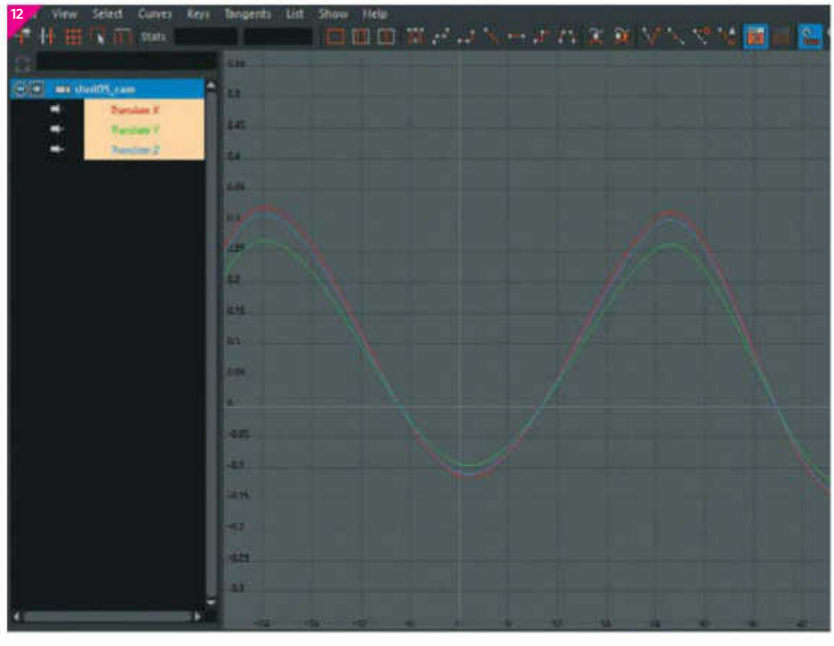
11 Bring it together You should have pretty much gone through the entire body and refined each section as a contained mass now. This is good for a first-pass clean-up phase but now we need to ensure everything flows as one. To do this, go through and work in a similar fashion only, as you work on one section, make sure to work it into the next section. The core works into the spine and legs, the spine into the neck, head and arms, and then the arms into the hands. By doing this and reviewing your work, you'll find that you've created an energy and a rhythm which flows through the movement.

12 Add movement to the cameras The last thing to do is add some subtle animation to the cameras. For our shot, we ended up creating a locator (which needs to be in the exact same position as the camera) and then parented the shot camera under it. This lets us use some simple expressions to simulate camera shake using the Translate attributes, whilst still being able to follow the action using the Rotate attributes. For example, using the Expression Editor, create the following expression for a camera called 'shot5_cam': 'shot05_cam.translateX = noise(time)/2.5;', 'shot05_cam.translateY = noise(time)/3;' and 'shot05_cam.translateZ = noise(time)/2.6;'. Once you have done that, hit play, have a look at the results and then tweak the expression to your heart's content! If you want to see the effects of the expression in the Graph Editor; make sure that you go to View>Show Results.









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Substance Painter 2

Allegorithmic's newest release offers several tools to help you create stunning, industry-standard texture art

Since its original release in 2014, Substance Painter has established itself as essential software for texture artists, especially in the videogames industry. It offers an intuitive software solution for creating PBR textures, which is now the standard in every major game engine. The 2.0 release comes in two different price models for indie developers and standard company licences. It also adds a lot of new features, enabling you to work with brushes, materials and masks in more efficient and creative ways.

Artists familiar with Substance Painter will feel right at home upon the first load of the new 2.0 build. While the tools and functionality remain in the same place, the UI has enjoyed a subtle but sleek update that adds bright blue lines on top of the shelf tabs as well as redesigned icons.

One of the most interesting new workflow enhancements are the so-called smart masks that appear next to the material tabs and also work hand in hand with each other. Adding generators, filters and paint layers onto a material mask is key to creating impressive texture work in Substance Painter. It lets you modulate the baked map inputs, which results in creating an infinite amount of unique wear-and-tear looks such as oil leakage, metal edgewear or subtle dust. With the new Smart Mask feature we can now make use of dozens of prebuilt masks to speed up workflow, not having to build them from scratch for every new mask. Most importantly we are able to name and save out our own generated masks and reapply them on any given occasion.

An often-mentioned feature request for Substance Painter was that of a built-in viewport renderer. This has now been integrated with NVIDIA's powerful Iray renderer as an alternative viewport and provides a seamless switch between the original viewport and Iray. Iray is a GPU-accelerated and CPU-based path tracer, which enables artists to render out beautiful hi-res images without having to leave the software. AMD graphics card owners will automatically be defaulted to CPU-based rendering.

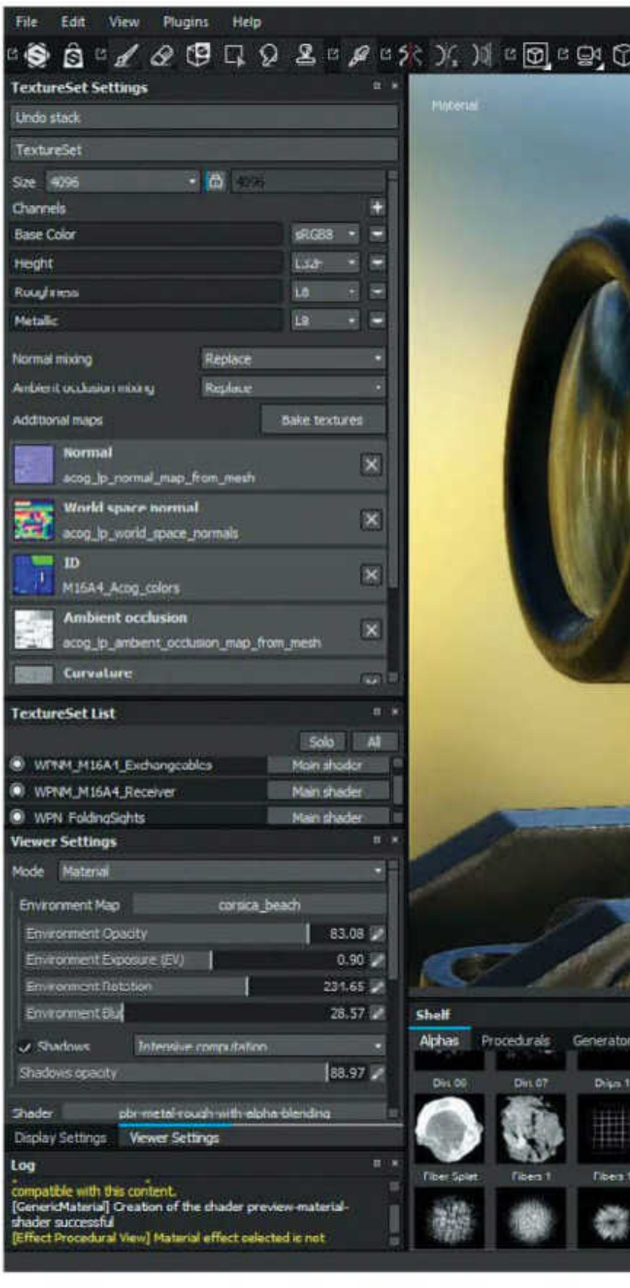
Features not yet included in the 2.0 launch, but announced for the 2.x cycle are 8K resolution, painting across texture sets, UDIM as well as a better use of high-DPI monitors. Allegorithmic reacted quickly by commenting that these are seen as high-priority features on its road map. It would without a doubt help to reach a wider audience beyond the gaming industry and it's going to be interesting to see which feature comes first.

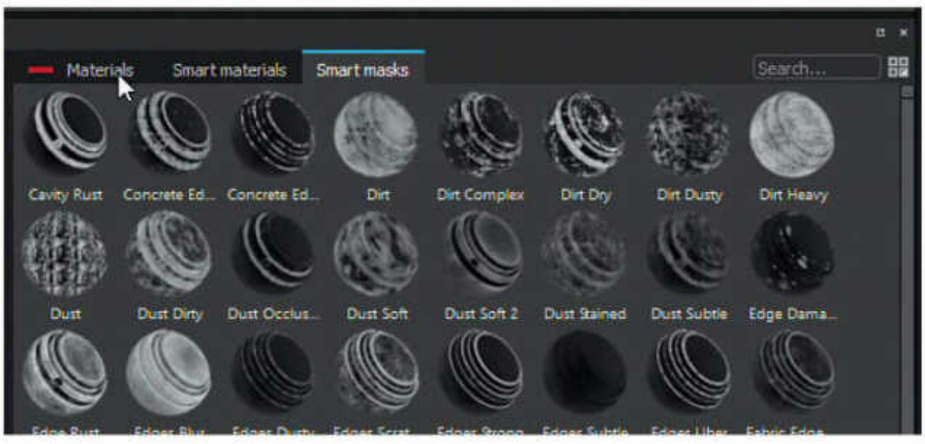
Another useful addition is the full-screen viewport toggle, which puts a swift end to constantly having to rearrange the toolbars in order to get the maximum available viewport space. Allegorithmic has further added a smudge and a clone brush, which can be very efficient for getting rid of texture seams.

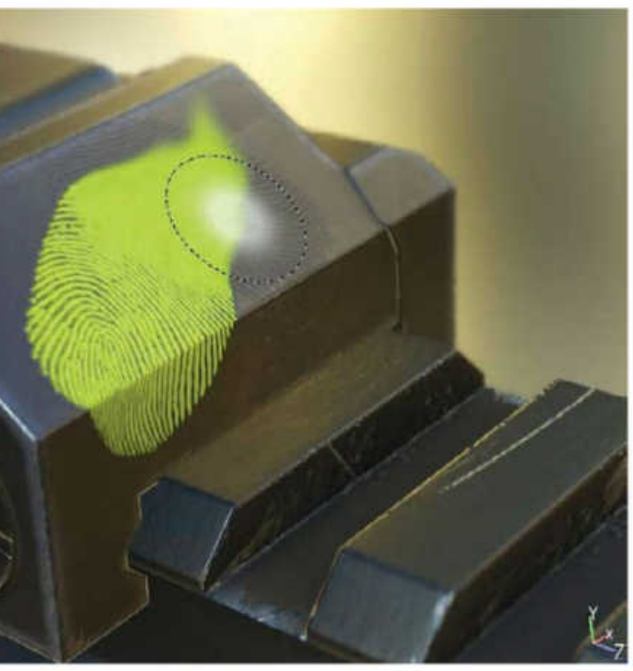
The alpha and texture library has had an extensive content update with hundreds of new additions to pick from, enabling you to add a lot more detail to the textures if necessary. New scan-based PBR materials add to the library of materials to pick from, and it's now possible to switch to an orthographic view which can be very useful when doing actual painting on the object.

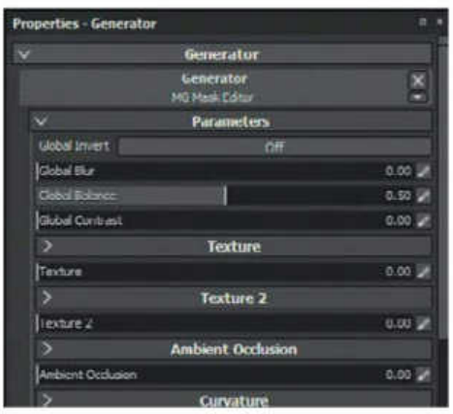
With the new release, Allegorithmic has improved the already superb Substance Painter texturing experience in many fields, offering artists an ideal solution for baking, texturing and rendering their artwork. Allegorithmic has proven that it listens closely to the community and has let feedback help shape releases. With the outlook towards further strong upgrades for the 2.x cycle, Substance Painter is building its dominance as the best standalone texturing software for artists in the videogames industry.

Tim Bergholz









MAIN Where all the action happens: the Substance Painter 2.0 viewport and UI, which has received a subtle redesign

FAR LEFT New to Substance Painter 2.0 are the smart masks that let you drag and drop prebuilt masks

LEFT The Smudge brush is seen here. Also new is the Clone brush, useful for editing out texture seams

ABOVE The mask editor replaces the mask builder from previous releases, enabling us to edit the image map inputs and generate an infinite amount of effects

Essential info

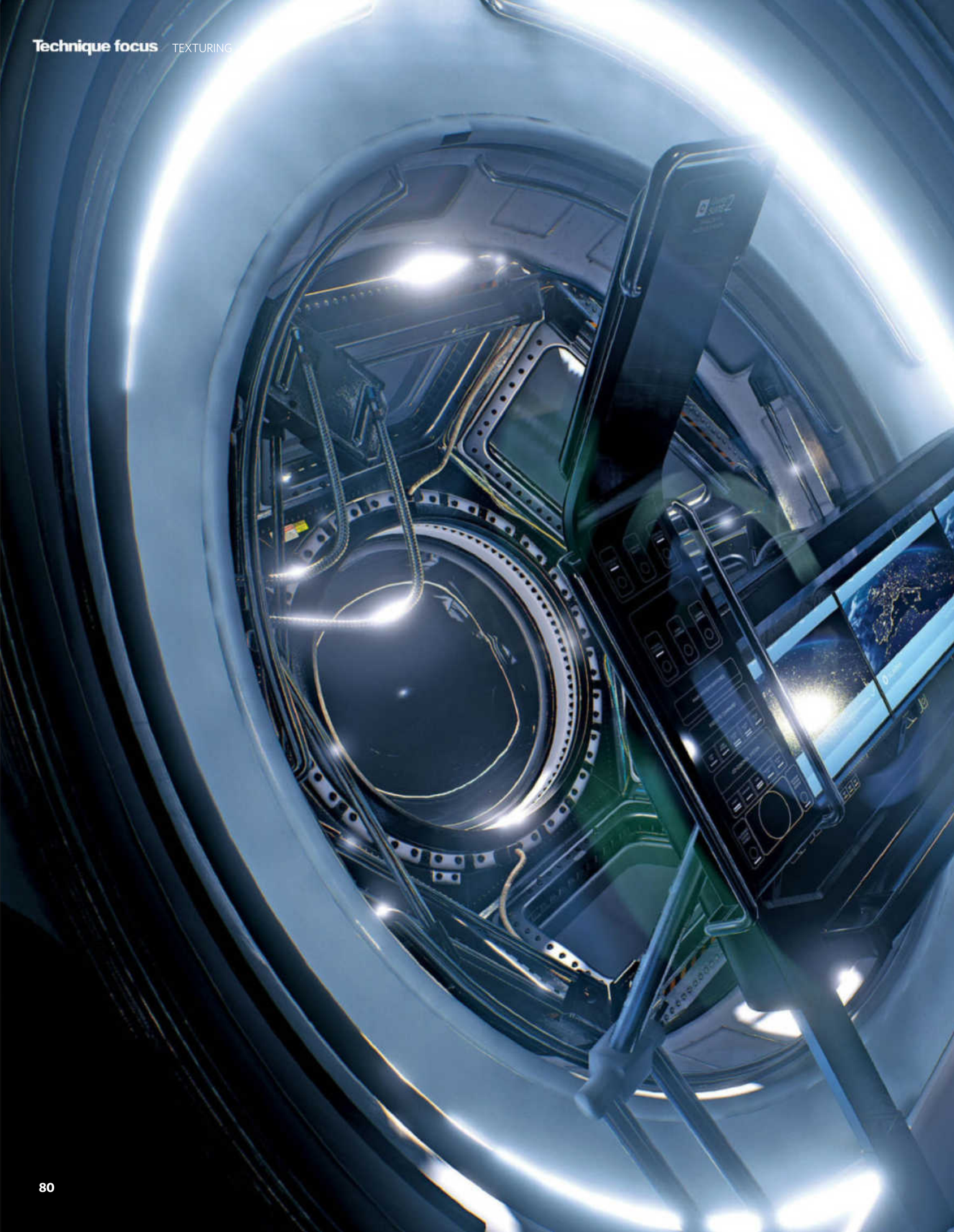
Price	$149 Indie licence, $590 Pro licence
Website	allegorithmic.com/buy/download
OS	Windows 7 and up – 64 bit mandatory / Mac OS X 10.7 and up
RAM	4GB
Graphics	1GB VRAM
HDD	150MB available space
GPU	Integrated not recommended

Summary

★★★★☆ **Features**
★★★★☆ **Performance**
★★★★★ **Design**
★★★★★ **Value for money**

Verdict ★★★★½

Allegorithmic continues to deliver substantial new features for its flagship Substance Painter software



Technique focus

Incredible 3D artists take us behind their artwork

TEXTURING I started working on this environment with the goal of challenging myself and the Quixel SUITE. I used a consistent Color ID map preset and automated all the texture bases with the SUITE, allowing me to spend most of my time polishing and making the textures unique. The models were created in Maya and the scene rendered in Unreal Engine 4.

Wiktor Öhman
artbywiktor.com

Wiktor is art lead at Quixel, working with promotional art and learning material

Software Quixel SUITE, Maya, Unreal Engine 4

Quixel SUITE Spacex Inspired Environment, 2016

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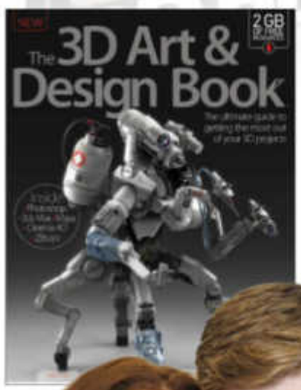

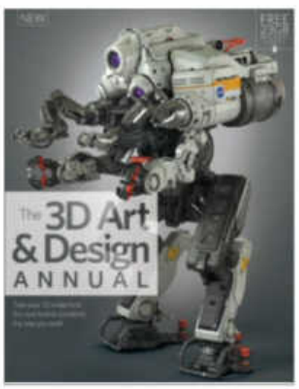

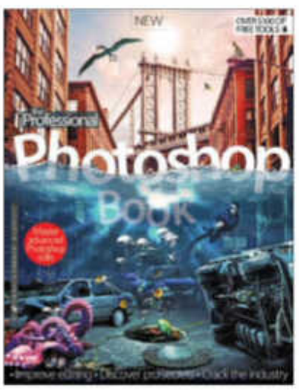

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The Hub

The inside guide to industry news, VFX studios, expert opinions and the 3D community

> "Every year BFX just keeps growing. We have involvement from the biggest studios in the world"
>
> **Sofronis Efstathiou,** BFX Festival director

084 Community news

FMX 2016

Find out how the annual computer graphics conference in Stuttgart is focusing on VR, plus the BFX competition launches

086 Industry news

CryEngine: pay what you want

Crytek announces a brave new pricing scheme, NVIDIA launches a monster GPU and Blender 2.77 arrives on the scene

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New Chinatown

Uniform reveals how it created a stunning visualisation for a new development in Liverpool

094 Social

Readers' Gallery

The latest images created by the **3dartistonline.com** community

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Alongside the presentations, there are also workshops at FMX

> This year's headline 'Blending Realities' puts an emphasis on sectors that are already deeply immersed in new forms of reality
>
> **Marie Ketzscher, FMX public relations**

FMX 2016 dives into virtual reality

The highly influential annual conference on animation, effects, games and transmedia tackles new forms with this year's theme – Blending Realities

FMX will encourage ticket-holders to engross themselves in all kinds of realities at the Haus der Wirtschaft in Stuttgart, Germany from 26 to 29 April. "In 2016, FMX enters its third decade at the forefront of digital entertainment, thus continuing to illuminate the latest trends across the effects, animation, VR, games and transmedia industries," explains Marie Ketzscher, FMX public relations.

"This year's headline 'Blending Realities' puts an emphasis on sectors that are deeply immersed in new forms of reality, such as virtual reality, augmented reality and beyond. Prominent confirmations include VR experts Jan Pinkava, who came up with the Oscar-winning feature *Ratatouille*, or Andrew Daffy, who directed the ground-breaking Avengers VR Experience (for Samsung Gear VR) for Framestore."

Alongside a series of talks about VR that includes a panel about the Future of VR, there's also a scheduled series of talks and panels about real-time storytelling. Storytelling in Virtual Reality will bring together panelists Jan Pinkava, Jason Fletcher-Bartholomew and Tim Ruffle (Aardman Animation), Chris O'Reilly (Nexus Productions) and Jacquie Barnbrook (The VR Company) for lively discussion.

"For the first time, a track will be dedicated only to sound design – presentations cover the Dolby Atmos sound system, sound design for *Inside Out* and *The Dark Knight Rises* and more. VFX remains integral to the FMX programme, with presentations by renowned VFX legends such as Rob Legato who is joined by Adam Valdez (MPC) to talk about the upcoming [release] *The Jungle Book*," reveals Ketzscher.

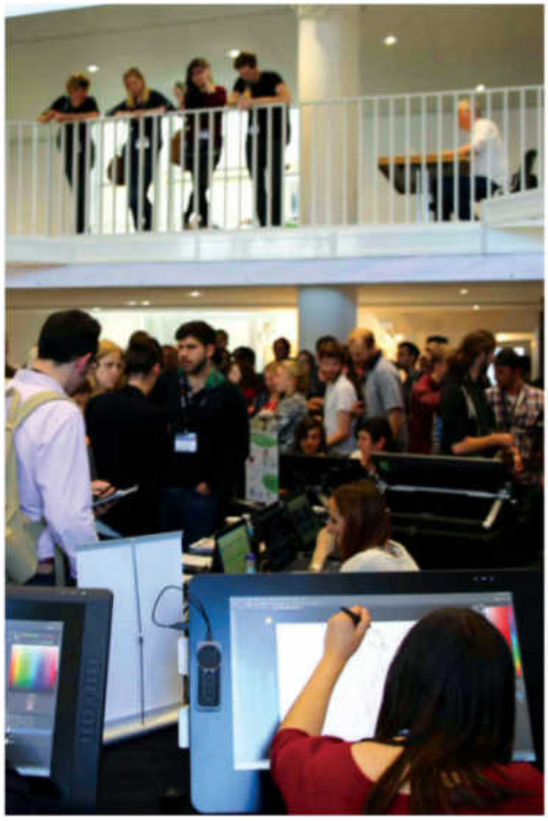
"Other VFX highlights include insight into Oscar-winner *Mad Max*, sci-fi favourite *The Martian*, Marvel's *Deadpool* and much more. Moreover, animation experts such as DOP Patrick Lin and character TD Tanja Krampfert (both from Pixar) give two presentations about Oscar-winner *Inside Out* and James Caliri, who directed the stop-motion sequences in *The Little Prince*, talks about his experience." For the talk, Krampfert, an alumna from the Institute of Animation at the Filmakademie Baden-Württemberg, talks about the creation of the bubbly character Joy, whilst Lin explains the special camera structure setup that was designed to parallel the main character's emotional journey.

Also this year, FMX is set to host a virtual production stage that will enable delegates to get their hands on a virtual

camera and produce short pieces in real time. Dirk van Gelder (Pixar Animation Studios) discusses Pixar's proprietary animation system Presto as part of the Tools of Tomorrow track, curated by Volker Helzle. Dr Marco Romeo (MPC) provides an overview of the Thalia R&D project that seeks to improve the quality and performance of digital actors' deformation and simulation, following the work on the digital Arnold Schwarzenegger in *Terminator Genisys*.

Sabine Heller (Blue Sky Studios) will demonstrate the character development from comic strip to 3D for the cult classic *Peanuts* as part of The Art of Animation track, and Dave-Alex Riddett (Aardman Animation) delves into cinematography for stop motion from a narrative perspective. Chris O'Reilly is among the speakers for the Games 4 Change series, discussing the interactive real-time gaming installation Woodland Wiggle, a therapeutic play space for children in hospitals. In addition Frank Vitz (Crytek) dedicates his time to the development of a new VR benchmark that uses CryEngine technology.

"FMX is comprehensive, high level and intimate at the same time," comments Jean-Michel Blottière, FMX executive director. "We bring together the animation, VFX, visual arts for games, VR and transmedia communities – communities that are not necessarily in touch with one another – and we cover various aspects of each from art to technology and business. We offer a programme with an intuitive, solid structure which allows people to understand quickly where they want to go and what they want to listen to."



Presentations from international schools and software products will take place at FMX's Marketplace

Photos: Reiner Pfisterer

This year's trailer for FMX is called 'Jazz Orgie' and was realised by Irina Rubina **youtube.com/watch?v=sX5m8ltV6Js**

For more information about the BFX Competition, and the BFX Festival, visit www.bfxfestival.com

Superstars return for BFX 2016

Returning for its fourth year, BFX will showcase the best games, films and animations from the last 12 months

BFX Festival runs from 10 to 16 October at the Bournemouth International Centre. The Pro day, run in collaboration with The Foundry, is aimed at visual effects professionals, where the latest techniques and softwares will be discussed as well as Festival activity with talks and workshops from industry professionals on making the best films and games of 2015 and 2016. A family-orientated weekend then follows.

Festival director Sofronis Efstathiou said, "Every year BFX just keeps growing, we have involvement from the biggest studios in the world, superstars of the visual effects industry who want to be a part of the Festival, share their work and give insights into some of the biggest and best movies and games – there will be something for everyone, from hands-on activities for children right the way through to visual effects professionals."

In addition to the Festival, a BFX Competition also takes place, with winners announced at the Festival itself. The Competition is now open for applications until 2 June to students and recent graduates from around the UK. They will receive mentorship by industry practitioners from some of the best visual effects companies in the world including Framestore, MPC, Double Negative and Animal Logic.

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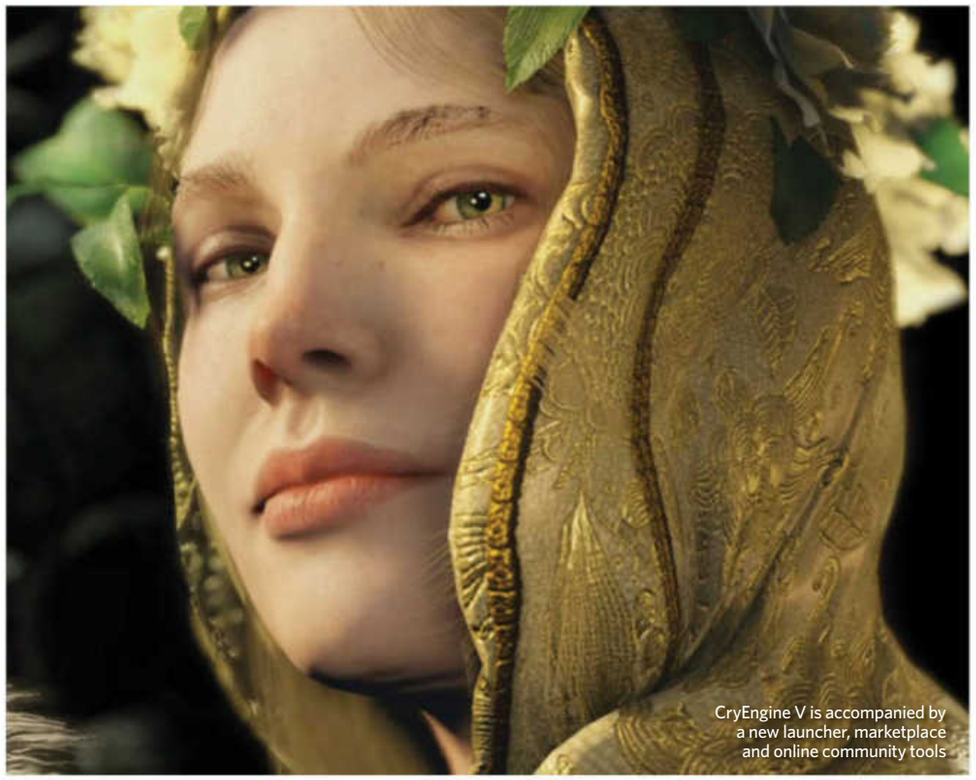


CryEngine V is accompanied by a new launcher, marketplace and online community tools

Get CryEngine V absolutely free

Latest version of CryEngine launched with a 'pay what you want' model and new marketplace

Crytek is offering full access to the latest version of its triple-A game engine, CryEngine V, and source code for a fee of their choice. Those who choose to pay can nominate up to 70 per cent of the fee to go to Crytek's Indie Development Fund that supports indie projects worldwide via grants.

Crytek's founder, CEO and president, Cevat Yerli, said of the new release: "CryEngine V represents our commitment to not only offering developers today's most advanced engine technology, but also to making it as accessible as possible.

"The arrival of CryEngine Marketplace, the revamped engine UI and new support channels will make it easier than ever to tap into the power of CryEngine – at a price that feels comfortable for each and every individual. Community is at the heart of our pay what you want model, which we hope will foster closer collaboration between us and developers as well as developers amongst themselves."

CryEngine V features include a new C# API, DirectX 12 support, a reworked low-overhead renderer for hardware performance increases, new particle and volumetric cloud systems, streamlined UI and a dedicated support channel for Q&As. There's also expanded support for virtual reality hardware, enabling users to create VR experiences for PlayStation VR, Razer OSVR, HTC Vive and Oculus Rift.

CryEngine Marketplace opens

Currently in beta, the CryEngine Marketplace (cryengine.com/marketplace) is now open for business. The platform hosts free and commercial assets from Crytek's library that can be modded or used as is, as well as third-party materials, sounds, and 3D objects created by the community and trusted vendors.

Exponential-e launches RaaS with Microsoft

The cloud provider works with Azure to form near real-time rendering

The newly revealed render-as-a-service (RaaS) platform from Exponential-e and Microsoft will combine the cloud and network provider's high-speed, secure network alongside the hyperscale public cloud of Microsoft Azure. The RaaS platform will be able to offer near real-time rendering for users and it is currently in beta testing through VFX studio Jellyfish Pictures.

"Due to steadily rising image resolutions, rendering is requiring more and more computing horsepower. Also the limitations of power, space and cooling for in-house render farms means they are increasingly more expensive and complex to run," explained Exponential-e's managing director Mukesh Bavisi.

"Exponential-e's collaboration with Microsoft Azure solves the headache of restricted resource on maxed-out internal render nodes."

The RaaS solution offers the flexibility to scale resources on demand, thus it will enable many studios to bid competitively for larger projects. "Rendering is a resource-intensive workload ideally suited to Azure's enterprise-grade, hyperscale infrastructure," said Nicole Herskowitz, senior director of product marketing at Microsoft Azure, Microsoft Corp. "We're excited to work with Exponential-e to enable a hybrid rendering solution that provides flexibility for customers in this emerging market."

The partnership will deliver hybrid render services to a range of industries that utilise 3D

HAVE YOU HEARD? SideFX is now offering Houdini Engine Indie entirely free to studios making under $100,000 annually

NVIDIA shows off incredible GPU

The second-generation NVIDIA Quadro M6000 boasts twice the onboard memory of its predecessor

NVIDIA's top-end professional graphics card has received a mid-cycle upgrade aimed at relieving bottlenecks faced by professionals working on resource-demanding projects to tight schedules. Based on the same hardware as the existing Quadro M6000, the second-generation GPU now has an incredible 24GB of VRAM, the highest amount available on a single-GPU graphics card.

Erik Strauss, executive director of software development, Sony Pictures Imageworks commented: "We regularly push the limits of our ability to display and interact with very complex scenes. The Quadro M6000 24GB gives us a ten-times performance boost with the throughput necessary to display these types of large scenes smoothly and interactively."

The new card phases out the 12GB model, but doesn't come with a price increase

Kinematic Lab unveils plugins

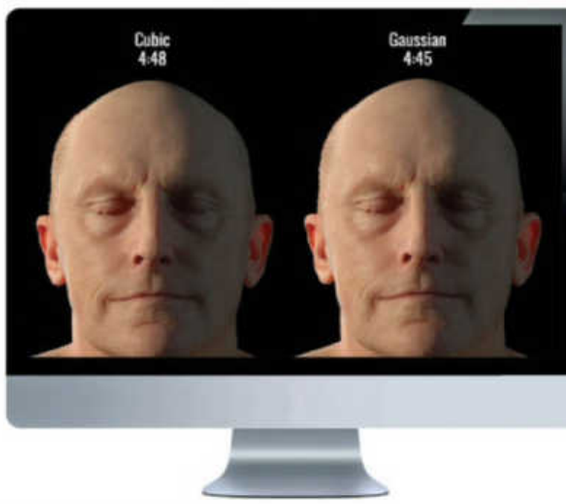
Three new 3ds Max OverMorpher tools developed by the Lab at Hocus Pocus studio

Kinematic Lab has just released three plugins: World Space, Mesh Space and Pose Space. World Space is for sculpting poses in animation that can be blended over any mesh deformations such as Skin Modifiers, point caches, cloth simulations and Alembic Caches. Mesh Space works like a morpher over an animated mesh for adding and animating deformations that your rig can't do, or adding morphologies to copies of the same animated mesh. Finally, Pose Space lets you create corrective poses that are driven by the distance between Point Helpers rather than angles between bones.

Blender 2.77 released

The first update of the year is packed with improvements but no longer supports Windows XP

The Blender Foundation's newest release has wide-ranging updates including Cycles rendering gaining a new method for subsurface scattering calculation, GPU support for smoke/fire and point density, customisable motion blur position, support for rolling shutter, custom baking passes with extra control over the direct and indirect contributions. For modelling, the Decimate modifier now takes symmetry into account, a Boolean tool is available in Edit-mode and there is an option to have default UV unwrapping for new geometry. For animation, a new Constraints interpolation method is added to give better results when interpolating non-uniformly scaled matrices and Cursor X can have fractional values when in Drivers mode.



Christensen-Burley is an improved SSS algorithm that preserves more details than Cubic/Gaussian falloffs

Software shorts

Bringing you the lowdown on product updates and launches

Stingray 1.2

Autodesk adds native support for the HTC Vive VR platform and an Oculus Rift SDK 0.8 to Stingray 1.2. Other enhancements include faster project and asset import with multi-CPU compiling, workflow and UI improvements for everyday tasks. New rendering options make it easier for you to find lost objects within large scenes.

Maya LT 2013 Extension 3

Extension 3 of Maya LT gains a new Quick Rig tool for automated creation and placement of bipedal character rigs, and HumanIK support for up to five roll bones per limb. There's also improved modelling and UV toolsets, a new shape-authoring toolset and shape editor, plus an updated game exporter.

Godot 2

Open source 2D/3D game engine Godot 2 has received long-awaited usability changes and an improved user interface. New core features include scene instancing and inheritance, text-based scene format, support for ZIP packs on export instead of PCK, compatibility with OPUS audio format, improved gamepad support and more.

DID YOU KNOW? The Blender Foundation is celebrating ten years since its first open movie project, 'Elephants Dream'

Technique focus

Incredible 3D artists take us behind their artwork

VERTEX PAINTING In this image I worked on the material of the cars; I mixed them with some details that I had put in the piece to get the result that I wanted and expected. To make the materials of the car I used Blend and VertexPaint Color and Modifier. I created three different shades and then I mixed them with Blend and VertexPaint Color to get the final result.

Gilvan Isbiro
ng3d.blogspot.com

3DArtistOnline username
Gilvan

Software 3ds Max, V-Ray, Photoshop

Cemetery of Cars, 2016

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UNIFORM

Description Uniform is a creative consultancy that works with organisations to reimagine their business in retail, property, sport and the arts.

Website uniform.net

Location UK

Project New Chinatown

Project description A short film that combines an animated dragon with photoreal CG elements for an arch-vis project, showcasing the proposed vision for Liverpool's New Chinatown.

Studio Uniform

Contributors Mark Lee, associate creative director

New Chinatown

Mark Lee of Uniform talks us through the creation of a mighty dragon in its newest short film

Getting to work on a huge mythological beast is a tremendously creative task, "It's not every day you get to animate a dragon," Mark Lee, associate creative director, reveals with evident delight. "In terms of the concept, the client was the architect and they came to us wanting a film to showcase the development to investors and planners." Lee recalls how Uniform's client's (Blok Architects) design was inspired by the form of a Chinese dragon. "They referenced Chinese heritage: the colour red and the dragon. We were then able to take that reference and develop a stylised, geometric dragon that became a strong and powerful identity.

"To initially get the job we over-delivered. We storyboarded and did concept work. We got a lot of mood boards together. (Blok) gave us the freedom to suggest and tie some of the neon world into the actual façade detail of the design."

Certainly, Uniform's project crew (comprising of four artists) were able to imprint their own creative stamp on the work. "We looked at street (paper) dragons and mostly snake references," Lee explains. Of the film's dragon, he recalls that "At the first meeting we unveiled a 3D-faceted mean and angry dragon and they loved it. There was a sigh of relief. We then went straight into production of the animatic. We took the dragon and animated it climbing on top of one of the (client's) buildings, which went down extremely well!"

In realising the architectural space seen in the promo, Uniform "made heavy use of parametric modelling techniques with the plugin RailClone," Lee explains. "We came up with a series of rules for the façades of the building that we could easily apply across everything, swap out windows when needed and update easily and quickly."

Adding dynamism to the presentation of the architectural concept in the promo, Lee explains, "We didn't want it to be a generic fly-through. We wanted to take dragon movement – lizard movement – and Chinese paper dragon movement" as the basis for "camera moves that were more dynamic". In doing so, the promo plays on the concept of what Lee calls "a dragon's eye-view without being too literal. At Uniform, our arch-vis team did the main fly-through and transition world with 3ds Max, and our film and animation guys used Cinema 4D with V-Ray to do the actual dragon. Compositing was done in a mixture of After Effects and Fusion."

Lee identifies a particular challenge for the project: "There wasn't the budget for green-screened filmed people. For the street shot we suggested 3D people in a time-lapse style. We made use of the latest version of Populate within 3ds Max as there are more advanced AI options in Populate's later iterations. We decided to go time-lapse with the people to hide the fact that they are 3D models, but retain a sense of activity, life and atmosphere."

"A great thing about this project was that it was based in Liverpool," says Lee. "We haven't done work in Liverpool for years, so everybody who's worked on it is very proud of it."

> "We didn't want a generic fly-through... We wanted camera moves that were more dynamic"
>
> **Mark Lee,** associate creative director

PRAGMATISM MEETS CREATIVITY

The challenge of adverse weather conditions compelled the team at Uniform to rethink an original plan for the film's closing images, applying an elegantly simple solution for a big-picture view.

"In the story we'd specified the Sun going down over the dock and a time-lapse aerial shoot," said Lee. Sure enough the forces of nature intervened and Lee and his team applied an inventive solution to realise the final shot showcasing the city. Originally planned as a filmed drone shot, the plan had to be reconfigured when strong winds brought the drone down. Lee explains that "We ended up taking a still photo (from the drone footage pre-crash) and animating twinkling city lights, time-lapse people, car streaks over the top of it, as well as a subtle faux camera movement."

UNIFORM

Dragon Styling

The dragon will be shown as a 'low poly' glowing neon form. It will be a simple geometric stylised version of a traditional Chinese dragon. The following mood-board shows our intentions for how it will look:

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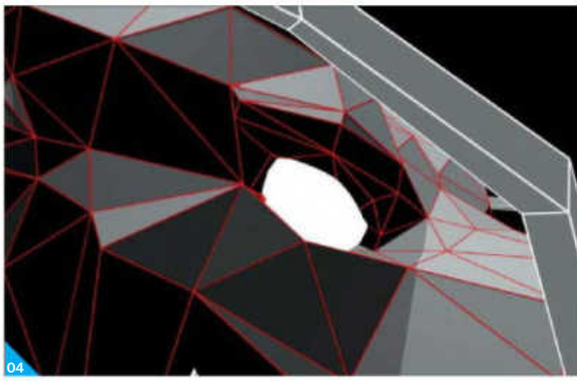
03



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01 The dragon's angry armatured appearance finds expression in its final form. It will be ultimately realised in motion with Cinema 4D and V-Ray

02 Determined to secure the commission, Uniform delivered a thorough range of conceptual art and materials to illustrate its take on the subject

03 Inspired by street carnival dragons, and the form and movement of snakes, Uniform's design and animation was met with enthusiasm by the client

04 The Uniform team committed themselves to creating a dragon that would have a real personality and intensity to it

05 A key challenge for Uniform was how best to realise the crowd element seen at various points occupying the New Chinatown spaces in the film

06 Initially intended as a moving image, the film's closing image had to be rendered using a still frame derived from drone footage

Technique focus

Incredible 3D artists take us behind their artwork

COMPOSITION The main objective began with the idea of a coffee presented in an artistic way, leaning on the beauty of the depth of field. I chose an interesting HDRI for the scene, set it as an environment map and played with rotation. Then, I set my camera at a nice angle and found an attractive place for taking advantage of the beautiful DOF effect.

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3DArtistOnline username
Lluis Cuenca

Software 3ds Max, Corona Renderer, Photoshop

Coffee cup – Testing Corona Renderer, 2015

AMD FIREPRO

Dell Precision 17 7000 Series

In his final diary entry, arch-vis expert Paul Hatton reflects on his workstation experience

In the third and final diary entry from my time with the Dell Precision 7710, I want to focus in on a specific tool called the Dell Precision Optimizer. This is a really clever tool that puts control of the system into the user's hands. Brilliant! During my time with the workstation I've found it invaluable for speeding up my workflow and ensuring that I can stay focused on my projects rather than coping with slowdowns.

There are three main sections, but I found the 'Profile and Policies' tab to be the most helpful in my day to day. This gives you a list of profiles that can be utilised, and the left-hand pane lets you activate and deactivate these. It's as simple as activating the profile and then launching your software – the idea here is that the Dell Precision Optimizer adjusts things like the number of processor cores being used for an app, GPU power coming out of the onboard AMD FirePro W7170M and more to ensure that the workstation runs at maximum potential when using 3ds Max or any other 3D program. The other two tabs enable you to maintain the system and it will even tell you if there's something going wrong with your system such as if a fan is on the way out.

In general I've really enjoyed using Dell Precision 7710 and I would highly recommend it to anyone working in 3ds Max and other creative applications. If you're able to cope with the battery life and portability then it will serve you incredibly well. The power and performance of its mobile Intel Xeon CPU and the considerable capabilities of the AMD FirePro W7170M graphics card mean that this workstation is extremely capable, no matter what you throw at it.

AMD FireRender

The GPU rendering plugin for 3ds Max boasts several advanced technologies

AMD's FireRender technology seems pretty advanced. It includes state-of-the-art sampling algorithms, is adaptive and includes multiple importance sampling. It also includes physically based materials which allow for easy setup of accurate, true-to-life materials with very little technical knowledge required. And finally, it has a physically based camera, which includes a huge amount of the functionality that a real digital camera would have.

I was hoping to enjoy much of this functionality in the FireRender plugin for 3ds Max but, at the time of writing, many of these features are still being integrated. I was unable to make use of either the physically based materials or physically based camera, although both of these sound like interesting and useful additions.

There is good news for both V-Ray and Corona users here – AMD FireRender supports Corona materials natively and V-Ray materials can be converted to a Corona format using the 'Corona Renderer material converter', meaning that FireRender looks set to be really viable within a 3D production environment.

Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

01 Whisper Of Darling
by Mohsen Hashemi
3DA username
Mohsen Hashemi
Mohsen Hashemi says: "This was not just work for me – it was inspired by the great Persian poet Hafez and it contains all my emotion and passion from the art of love. Love is immortal."
We say: *There's so much to talk about here, but we think the best areas of this image are the lighting and the incredible plaster texture that Mohsen has achieved on the back wall.*

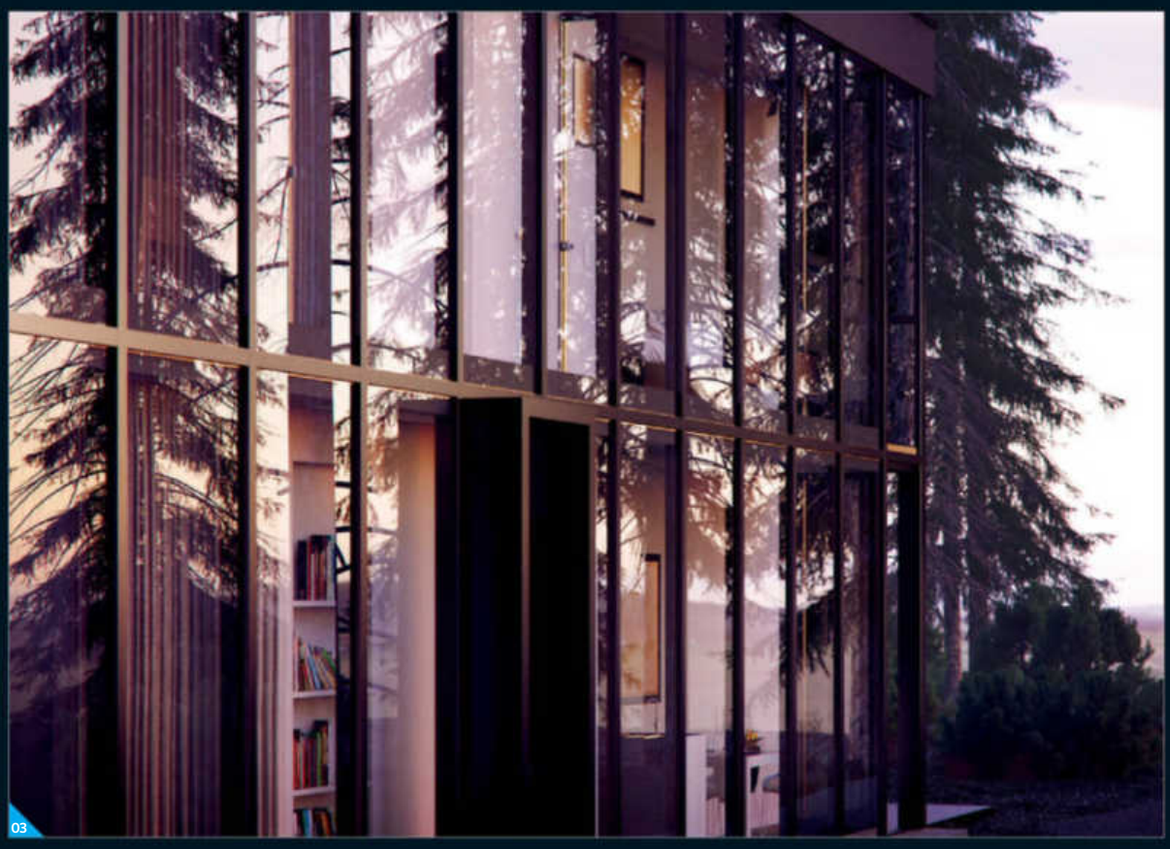
02 Frank – Detective Special
by Hernan Zuniga
3DA username
hernan3d
Hernan Zuniga says: "Frank is a special detective I've made, inspired by Seventies movies. I'd like to thank my friend Richard Kazuo for the rig and all at Techno Image for the support."
We say: *This is a really fun and expressive image that boasts a lot of great sculpting and texturing techniques. Also, great work with the hair and stubble!*

03 Black Box
by Oskar Füleki
3DA username
Visumetrie
Oskar Füleki says:
"Modern architecture in the middle of nature – the origin of everything. I wanted to create an optical contrast with a nice mood; maybe even something a little mystical."
We say: *Composition is key here – Oskar has done a brilliant job creating an interesting arch-vis scene that feels natural and elegant. Great work with the backplate integration.*

04 Maneki Neko
by Giuseppe Perna
3DA username
Giuseppe Perna
Giuseppe Perna says:
"The Maneki Neko, also known as Fortune Cat, is one of the most inspiring elements of Japanese culture and is thought to bring good fortune and wealth to its owner. In this project, I wanted to render the warm and intimate atmosphere of a Japanese interior."
We say: *Warmth and intimacy are both present and we love the inherent joy in this image. Diverse materials and a great render out of RenderMan elevate this scene even more.*

Image of the month

01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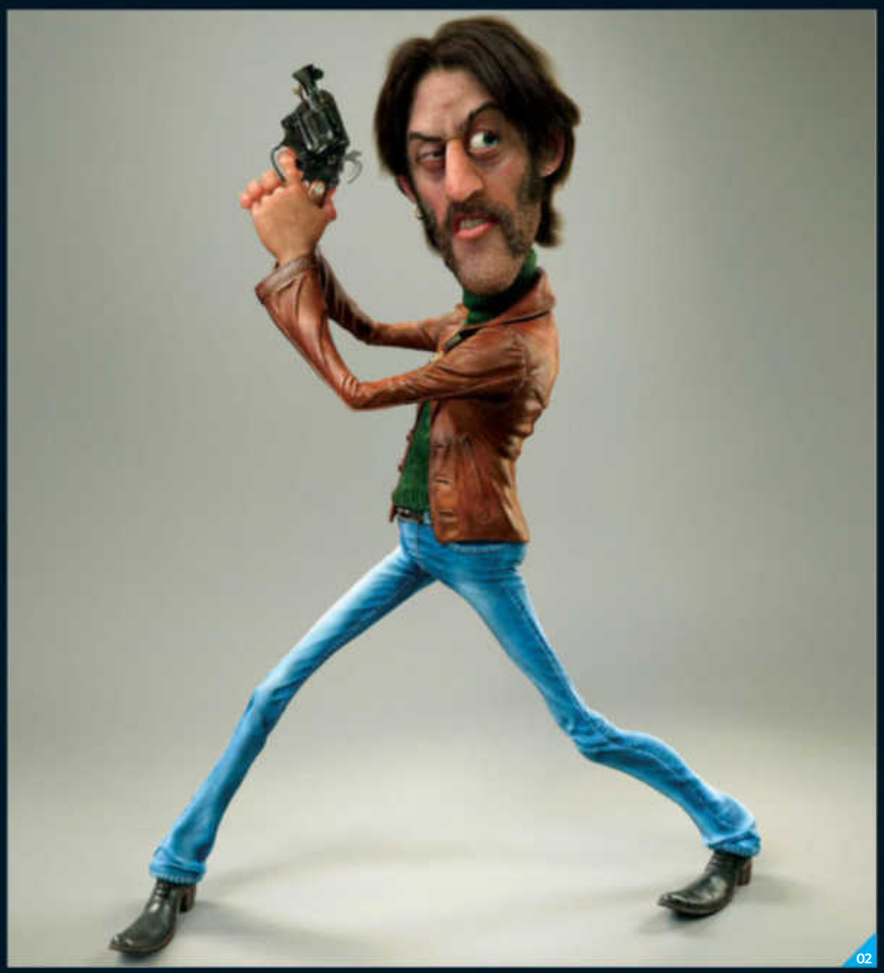

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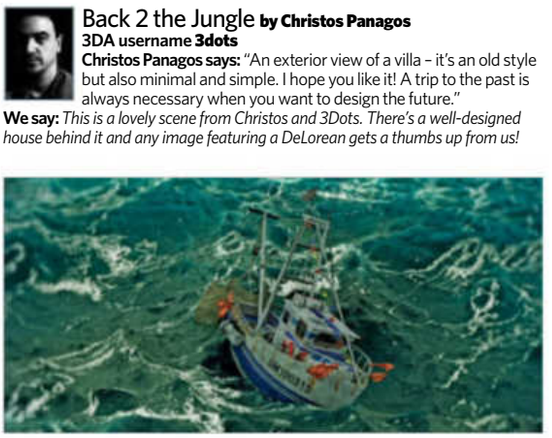
Lego Sport Car **by Alessio Rossi**

3DA username songuai

Alessio Rossi says: "Being a big fan of Lego products, I created this 3D sports car model. I like to reconstruct 3D Lego sets and make them as realistic as possible."

We say: *This is a near perfect re-creation of a Lego set – the plastic materials are so good it looks like you can reach out and touch it. Excellent work!*

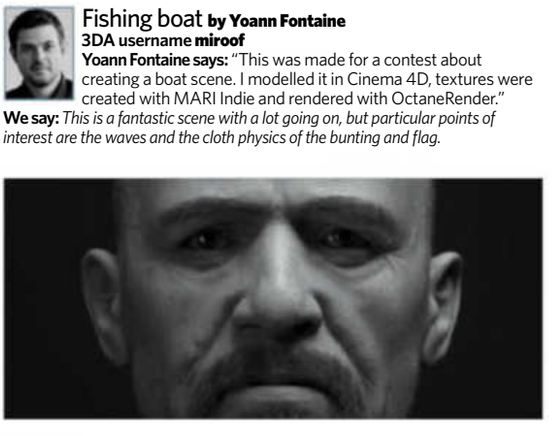


Back 2 the Jungle **by Christos Panagos**

3DA username 3dots

Christos Panagos says: "An exterior view of a villa – it's an old style but also minimal and simple. I hope you like it! A trip to the past is always necessary when you want to design the future."

We say: *This is a lovely scene from Christos and 3Dots. There's a well-designed house behind it and any image featuring a DeLorean gets a thumbs up from us!*

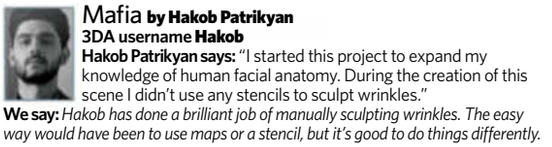


Fishing boat **by Yoann Fontaine**

3DA username miroof

Yoann Fontaine says: "This was made for a contest about creating a boat scene. I modelled it in Cinema 4D, textures were created with MARI Indie and rendered with OctaneRender."

We say: *This is a fantastic scene with a lot going on, but particular points of interest are the waves and the cloth physics of the bunting and flag.*



Mafia **by Hakob Patrikyan**

3DA username Hakob

Hakob Patrikyan says: "I started this project to expand my knowledge of human facial anatomy. During the creation of this scene I didn't use any stencils to sculpt wrinkles."

We say: *Hakob has done a brilliant job of manually sculpting wrinkles. The easy way would have been to use maps or a stencil, but it's good to do things differently.*

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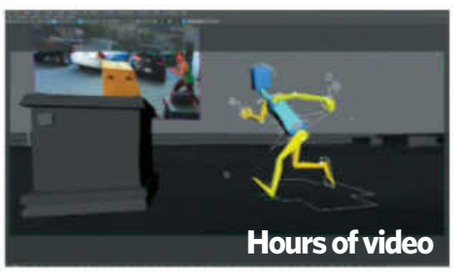

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